1953

QUEENSLAND

FIFTY-THIRD ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS

REPORT OF THE DIRECTOR

TO

THE HON. THE SECRETARY FOR AGRICULTURE AND STOCK

(As required by "The Sugar Experiment Stations Acts, 1900 to 1952")

BRISBANE

COMMONWEALTH MYCOLOGICAL INSTITUTE
28 DEC 1953

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BRISBANE

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FIFTY-THIRD ANNUAL REPORT OF THE BUREAU OF SUGAR EXPERIMENT STATIONS

TO THE HONOURABLE THE SECRETARY FOR AGRICULTURE AND STOCK

Dear Sir,—I have the honour to present the Fifty-third Annual Report of the Bureau of Sugar Experiment Stations, covering the period from 1st July, 1952, to 30th June, 1953.

Director.

Director's Report

GENERAL

The harvesting season of 1952, in contrast to the normal winter and spring period when dry conditions prevail, was characterised by favourable rainfall distribution. Crops continued to make steady growth throughout the period, and the tonnage of cane available for crushing was far in excess of early estimates. In February, 1952, the crop expectation was five and a quarter million tons of cane. By May this had increased to nearly six million and by August to 6,402,000. The crop finally cut was 6,841,536. An open winter in all districts and absence of drought and frost in the central and southern divisions combined to provide conditions very favourable for late crop development. The seasonal conditions not only produced far more sugar than was anticipated in 1952 but they gave to the 1953 crop an early start, which was largely responsible for the anticipated production this year. The rains during the harvesting season were not an obstacle to crushing operations.

The aggregate weekly crushing figures reflect the cane supply position. Over a seven-week period from mid September to the end of October the thirty-one factories averaged 298,000 tons of cane per week, the highest weekly figure for this portion of the season being 306,638. This is an advance of 8,000 tons per week over the best portion of the 1950 season and 32,000 tons per week above the highest seven-week period in 1951 when crops were light and cane deliveries unsatisfactory. With the improvements which have been made in mill capacities in recent years, the most extensive of which will come into use in the 1953 season, it can be expected that aggregate weekly crushings will advance considerably above the 300,000 ton mark. This will naturally bring in its train an increased requirement for cane-cutting labour as well as for increased sugar storage at mills and/or wharves. A raw sugar output some twenty-five per cent. higher than that of 1952 is expected this year and its removal within a similar period will tax existing installations and transport to the maximum.

The favourable climatic conditions which augmented the 1952 harvest and simultaneously sent the 1953 crop off to a good start continued into 1953. In the far north the wet season was characterised by a deficiency of sunny periods but in other districts cane development was rapid. There was no appreciable flood damage, and no serious frosting occurred to the end of June. Not since 1939 have all divisions of the sugar belt experienced, at the same time, so favourable a growing year, and the early crop development, unimpeded by serious checks, should ensure a sugar content higher than average. The almost complete absence of grub damage in the northern areas, due to widespread use of BHC, is contributing in no small measure to the annual harvestable tonnage, and the gradual elimination of major cane diseases is also having an appreciable effect on production.

CROP PROSPECTS, 1953 SEASON

The early estimate of cane available for harvest, taken in May, 1953, disclosed a crop of 9,044,083 tons from 341,495 acres. On the basis of an anticipated quality ratio of 7.3 this tonnage of cane was calculated to produce 1,237,600 tons of 94 n.t. sugar.

It was apparent during the subsequent three months, during which Queensland experienced a particularly dry period, that early forecasts would not be attained. Although at time of writing a second estimate has not been taken it is reasonable to assume a general scaling down of the State crop by about five per cent. to give approximately 8,600,000 tons of cane. But the higher than anticipated sugar content of the cane crushed up to the end of August suggests that the sugar production will be little below the original figure. Compared with the 1952 record production this year's crop promises to be higher by 1,750,000 tons of cane and 300,000 tons of sugar.

The reason for the very steep production increase is not only the very favourable season in all districts but, in addition, the large increase in area for harvest. The major portion of the newly assigned lands, brought into production as a result of the Empire sugar agreement,

TABLE 1.—RAINFALLS IN CHIEF CENTRES OF PRODUCTION DURING PERIOD JULY, 1952, TO JUNE, 1953, INCLUSIVE.

(Showing Rainfall (in Points), Number of Wet Days and Number of Days on which 20, or More, Points were Recorded, Monthly, for each 6-Month Period and for the Whole 12-Month Period.)

Centre	July			August			September			October			November			December			Period: 6 months			January			February			March			April			May			June			Period: 6 Months			Period: 12 Months			Average Annual Rainfall
	Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		Total Rain	Wet Days		
		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B		A	B	
Mossman ..	82	6	2	359	6	4	210	9	4	323	6	1	695	10	6	121	6	3	1,790	43	20	3,874	20	16	2,278	15	13	2,381	19	10	649	13	8	259	8	5	155	6	2	9,596	81	54	11,386	124	74	9,276
Cairns ..	136	8	2	258	6	3	136	6	4	225	7	3	263	6	4	230	8	3	1,248	41	19	4,080	25	16	1,551	19	12	2,401	20	16	593	11	6	177	3	3	139	6	4	8,941	84	57	10,189	125	76	8,635
Babinda ..	425	11	6	745	5	4	371	9	4	411	5	3	334	5	4	166	2	2	2,452	37	23	5,500	18	14	1,301	13	11	4,356	22	19	973	13	10	323	4	4	367	7	6	12,820	77	64	15,272	114	87	16,617
Innisfail ..	591	10	6	654	7	6	199	8	3	192	7	3	414	7	4	469	8	4	2,519	47	26	5,080	21	18	1,453	17	11	3,241	25	24	494	11	6	286	6	5	334	9	5	10,888	89	69	13,407	136	95	13,915
Tully ..	687	10	5	758	3	3	386	8	3	228	7	3	245	6	6	543	4	4	2,847	38	24	6,226	21	16	2,987	13	10	3,781	20	19	1,025	10	6	66	3	3	446	9	8	14,531	76	62	17,378	114	86	18,071
Ingham ..	86	6	1	109	4	4	149	6	3	167	6	1	280	5	2	299	6	4	1,090	33	15	4,959	20	17	3,120	15	13	987	21	18	244	12	3	9	1	0	52	6	0	9,371	75	51	10,461	108	66	8,064
Giru ..	37	1	1	0	0	0	48	1	1	0	0	0	88	3	2	219	2	2	392	7	6	3,937	18	18	1,415	13	11	376	4	4	190	2	1	0	0	0	0	0	0	5,918	37	34	6,310	44	40	4,596
Ayr	37	4	0	10	2	0	60	3	1	11	2	0	42	7	0	136	8	2	296	26	3	3,732	20	19	932	16	9	321	8	7	264	3	1	5	1	0	0	0	0	5,254	48	36	5,550	74	39	3,756
Proserpine ..	82	5	1	122	5	3	204	6	4	305	8	5	252	6	4	154	6	3	1,119	36	20	2,602	18	17	1,465	19	12	864	20	11	261	9	5	17	2	0	91	5	2	5,300	73	47	6,419	109	67	6,870
Mackay ..	32	4	0	91	7	2	156	7	2	128	10	1	137	5	2	159	8	3	703	41	10	2,296	22	16	1,030	14	7	394	20	6	428	6	4	267	6	1	70	3	1	4,485	71	35	5,188	112	45	6,316
Sarina ..	76	7	2	79	7	2	71	4	1	243	6	3	236	7	5	355	10	5	1,060	41	18	2,631	18	16	1,033	15	9	743	17	11	333	5	3	126	5	2	42	3	1	4,908	63	42	5,968	104	60	6,724
Bundaberg ..	71	9	1	184	8	3	140	8	1	444	12	5	365	9	5	515	10	6	1,719	56	21	694	14	4	488	13	3	1,294	14	7	594	9	3	454	8	2	84	6	2	3,608	64	21	5,327	120	42	4,237
Childers ..	122	6	1	144	8	3	106	7	1	282	10	4	295	5	4	237	8	2	1,186	44	15	599	12	8	1,282	13	9	1,226	12	7	434	11	4	53	4	1	52	2	1	3,646	54	30	4,832	98	45	4,144
Maryborough	154	13	2	208	9	2	193	9	4	151	12	2	103	6	2	119	10	1	928	59	13	396	18	3	1,102	17	9	1,619	18	9	407	11	5	46	6	0	21	3	0	3,591	73	26	4,519	132	39	4,543
Nambour ..	329	13	5	314	10	5	229	8	3	496	14	7	129	4	3	218	10	6	1,715	59	29	940	14	7	2,467	15	11	1,285	15	9	648	11	4	143	4	3	0	0	0	5,483	59	34	7,198	118	63	6,510
Beenleigh ..	160	6	3	271	5	3	111	4	3	652	8	8	57	2	2	179	7	2	1,430	32	21	670	10	6	1,706	11	6	892	10	5	150	5	1	121	4	1	0	0	0	3,539	40	19	4,969	72	40	4,395

Wet Days: Columns "A"—Total Days on which Rainfalls were recorded. Columns "B"—Totals Days on which 20, or more, points of rain were recorded.

will be harvested for the first time in 1953, and this has coincided with a season which has no parallel since 1939. It is very fortuitous that so favourable a season occurred in the first year of the agreement when the Australian industry was required to meet an export commitment of 600,000 tons of sugar.

The May estimates disclosed one mill with an anticipated crop of 500,000 tons, three in excess of 400,000, and 15 over 300,000. Last year's record crushing by a Queensland mill of 421,739 tons will be exceeded by more than one factory this year.

The New South Wales mills anticipate a crop of 280,000 tons of cane and an output of 34,000 tons 94 n.t. sugar.

In Table II the individual mill estimates (taken in May) for the 1953 season are shown, together with the actual crushings for the preceding year.

TABLE II

Sugar Cane Harvested, 1952—Estimated, 1953

Domestic Tonnages	Actual Tonnages		Mills	Estimated, 1953 (May estimate)
	Accepted	Condemned		
179,097	179,097	36	Mossman	200,000
274,982	274,982	49	Hambledon	380,000
312,114	312,114	32	Mulgrave	351,000
285,839	285,839	0	Babinda	346,374
280,528	280,528	257	Goondi	300,000
383,011	383,011	0	South Johnstone	415,000
247,903	247,903	35	Mourilyan	252,872
421,739	421,739	402	Tully	400,000
354,686	343,989	55	Victoria	500,000
352,920	363,617	0	Macknade	390,000
3,092,819	3,092,819	866	..	3,535,246
117,782	117,782	0	Invicta	203,360
283,907	283,907	0	Pioneer	325,000
315,382	315,382	59	Kalamia	350,100
378,849	378,849	22	Inkerman	438,000
1,095,920	1,095,920	81	..	1,316,460
250,356	250,356	24	Proserpine	394,000
112,784	112,784	11	Cattle Creek	150,000
212,026	211,954	0	Farleigh	350,000
254,001	254,073	30	Racecourse	368,000
85,719	85,719	4	North Eton	180,000
201,632	201,560	15	Marian	322,000
256,108	256,180	56	Pleystowe	361,125
217,141	217,141	26	Plane Creek	360,000
1,589,767	1,589,767	166	..	2,485,125
89,050	89,009	7	Qunaba	130,000
219,279	214,422	88	Millaquin	296,000
198,045	197,734	86	Bingera	330,000
193,886	199,095	309	Fairymead	300,000
37,037	37,037	219	Gin Gin	100,000
126,335	126,335	42	Isis	250,000
67,830	67,830	36	Maryborough	111,252
119,302	119,302	103	Moreton	160,000
12,266	12,266	0	Rocky Point	30,000
1,063,030	1,063,030	890	..	1,707,252
6,841,536	6,841,536	2,003	..	9,044,083

1952 CROP STATISTICS.

Although the May, 1952, estimate of the harvestable crop for that year was as low as 5,939,793 tons of cane, very favourable winter and spring conditions were responsible for considerable late development. The crop ultimately treated by the 31 mills in Queensland totalled 6,841,536. The additional tonnage condemned was 2,003, this quantity not reaching the standard of quality attracting minimum payment; two far northern mills and three southern ones accounted for 64 per cent. of this total. The aggregate tonnage crushed was a State record and provided a striking example of the influence of late seasonal conditions. The previous record, established in 1950, was exceeded by 149,830 tons.

Babinda, South Johnstone, and Tully began crushing operations during the last week in May. Ten other mills started in June, eight in July, eight during August, while Gin Gin and Rocky Point did not commence operations until September. The longest crushing season was at Tully when the record crop of 421,739 tons extended the period to 34.4 weeks. Only three

other mills, South Johnstone, Mourilyan, and Inkerman, experienced seasons in excess of 30 weeks. Of the remaining 27 factories eleven had seasons of less than 20 weeks' duration. There was more lost time due to cane supply than in 1951 but the season was not characterised by excessive harvesting delays.

Sugar produced on a 94 net titre basis was 934,614 tons, including local sales of 388 tons. This figure was also a record, exceeding the previous peak output of 1948 by 24,565 tons. There was an increase in harvested acreage compared with 1948 so that the sugar yield per acre was actually slightly below the figure recorded in that year. The improved growing conditions which were experienced late in the season were more favourable to the North of Townsville than the South of Townsville districts. The proportion of the total sugar produced in the former region rose to 45.1 per cent. compared with 43.3 per cent. in 1951 and below 40 per cent. in the previous three seasons. The relative production figures are shown in Table III.

TABLE III

Sugar Production (94 Net Titre), 1947-1952

Districts	1947	1948	1949	1950	1951	1952
North of Townsville ..	255,958	356,969	345,684	344,944	304,786	421,921
South of Townsville ..	315,700	553,030	551,583	534,900	399,556	512,693
Totals *	571,658	910,049	897,267	879,844	704,342	934,614

* Except 1947, Local Sales included.

The quality ratio rose to 7.32. The figure has been above 7.0 since 1944, reaching a peak in the excessively wet 1950 season. It had fallen to 7.11 in the dry 1951 year, but the latest rise in a season which can scarcely be described as abnormal indicates that, with present day varieties at least, there is little likelihood of attaining the "below 7.0" figures which marked the period in the thirties and early forties.

Table IIIa gives data on the acreage of plant, ratoon and standover cane harvested in the four major State divisions. The 1951 figures in the last annual report were somewhat abnormal because of the quantities of cane which had been left to standover after the wet 1950 season. This year's table shows the position in a normal year. The ratio of plant to ratoon cane has changed considerably in the year and this is probably due to the new land being brought into production having an influence on the total acreage of plant cane harvested. The ratio has altered for the whole State from 1 : 1.53 in 1951 to 1 : 1.32 for 1952. In the Lower Burdekin the position has not altered appreciably, the relative figures being 1 : 0.69 and 1 : 0.67. There is a definite trend in this district to grow more ratoons than heretofore and, with the accent on Pindar and Trojan, there should be a steady improvement in the ratio from now on. It is somewhat disturbing to see the low proportion of standover cane in South Queensland where the percentage of the total crop has now decreased to 15.3 per cent. The maintenance of a good proportion of standover cane, of suitable varieties, has a stabilising effect on average sugar content of the crop in the Southern division, and since varietal limitations due to disease susceptibility are now largely removed a return to previous practice is desirable.

TABLE IIIA

Classes of Cane Harvested, 1952

Districts	Plant Cane		Ratoons		Standover		Total Acres
	Acres	%	Acres	%	Acres	%	
Northern	43,421	38.9	67,640	60.7	435	.4	111,496
Burdekin	17,949	59.3	12,081	39.9	260	.8	30,290
Mackay	40,206	46.9	45,060	52.6	444	.5	85,710
Southern	13,283	28.1	26,769	56.6	7,209	15.3	47,261
Whole State	114,859	41.8	151,550	55.2	8,348	3.0	274,757

The comparative district figures of total production and per acre output shown in Table IV provide an interesting assessment of district productivity in a given year. Cognisance should of course be taken of seasonal variability. In the year under review the Lower Burdekin, with 5.34 tons of sugar per acre, exceeded its own 1948 record of 5.14 tons. This is an exceptionally fine performance for a district covering four mill areas, particularly when keeping in mind that 99.2 per cent. of the acreage harvested was one year cane. The best individual mill area performance was at Inkerman with 5.79 tons of sugar per acre harvested. The proportion of the cane crop grown north of Townsville rose by over two per cent. from 1951 to 45 per cent. of the total. The State figure of 24.9 ton per acre has been exceeded only in 1950 when a figure of 25.98 was recorded.

TABLE IV

Total and Average Yields by Districts, 1952

Districts	Tons of Cane	Tons Cane per Acre	Tons 94 N.T. Sugar per acre
Mossman-Ingham	3,092,819	27.74	3.78
Lower Burdekin	1,095,920	36.18	5.34
Proserpine	250,356	20.08	2.81
Mackay	1,339,411	18.29	2.61
Bundaberg-Gin Gin	737,297	24.02	2.79
Childers-Maryborough	194,165	17.04	2.04
Nambour-Beenleigh	131,568	25.44	2.98
Whole State	6,841,536	24.90	3.40

Production statistics over a period of ten years, and including acreage figures are given in Table V.

TABLE V

Acres Cultivated and Harvested, Yields of Cane and Sugar, Acre Yields and Quality of Cane, 1943-1952

Year	Acres* Cultivated	Acres Harvested for Milling	Total Yields		Yields per Acre		Tons Cane per ton Sugar
			Cane	Sugar	Cane	Sugar	
1943	326,478	228,895	3,397,424	486,747	14.84	2.12	6.98
1944	317,386	222,215	4,398,190	643,540	19.79	2.90	6.83
1945	326,247	239,826	4,551,982	644,661	18.98	2.69	7.06
1946	317,766	228,395	3,714,475	512,086	16.26	2.24	7.25
1947	332,516	220,649	4,150,987	†571,658	18.81	2.59	7.26
1948	384,213	258,585	6,433,556	†910,049	24.88	3.52	7.07
1949	395,660	275,313	6,518,021	†897,267	23.67	3.26	7.26
1950	381,545	257,562	6,691,706	†879,844	25.98	3.42	7.61
1951	388,348	273,371	5,005,172	†704,342	18.31	2.58	7.11
1952	—	274,757	6,841,536	†934,614	24.90	3.40	7.32
Averages	—	247,957	5,170,305	718,481	20.85	2.90	7.20

* Supplied by Government Statistician. † Includes Local Sales.

The molasses production and disposal table shows a still higher proportion of the total production being used as fertilizer. In the past three years the percentages used for this purpose have been 19, 22, and 24, and comparing the years 1950 and 1952 when molasses production was the same the tonnage utilised for application to soils increased from 36,446 to 47,260. However, this tonnage is still below that of 1949. Over 9,000 tons, nearly one-fifth of the total, was used in one mill area where some appreciation is felt of the dependence of the factory on well nourished soils.

TABLE VI

Details of Molasses Disposals for Periods 1943-1952.

Usage	Tons of Molasses:—									
	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Distilleries	47,894	59,516	61,307	69,842	54,014	119,615	115,376	99,940	79,063	99,410
Fertilizer	13,837	17,885	20,095	18,938	23,276	34,655	49,293	36,446	34,529	47,260
Stock Feed	19,923	30,742	30,559	45,288	34,808	38,349	36,479	36,621	37,151	37,099
Mill Fuel	14,194	14,668	11,426	6,238	9,340	11,003	9,771	15,556	6,327	5,882
*Ferment	—	—	—	—	—	2,479	3,561	3,582	2,033	2,532
Other Purposes	2,879	1,657	2,765	1,575	2,047	161	1,204	231	9	151
Wasted	637	109	333	415	99	1,099	1,858	325	235	482
Totals	99,364	124,577	126,485	142,296	123,584	207,361	217,542	192,701	159,347	192,816

* Prior to 1948, Molasses used for cleaning Ferment was included with that shown under heading "Other Purposes."

SUGAR VALUES, 1952 SEASON

The Sugar Board has declared the final price for the 1952 season's sugar as follows:—

	No. 1 Pool			No. 2 Pool	Total
	Home Consumption	Surplus	Total	Excess	
Tons	463,218	415,386	878,604	55,622	934,226
Per cent.	52.7221	47.2779	100	—	—
Price	£44 3 0	£41 2 0	£42 14 2	£41 2 0	£42 12 3

In addition the values for New South Wales production were:—

	Home Consumption	Surplus	Total
Tons	14,263		14,263
Per cent.	100		100
Price	£44 3 0		£44 3 0

The value of sugar production in Queensland for the 1952 season was therefore £39,809,705, excluding local sale sugar.

The following Table summarises production and consumption figures and sugar values for the past ten years. A table of mill peak allocations is also given below to indicate the years in which various Mill Peak Schedules operated.

TABLE A

Year	Total Sugar Production at 94 n.t.	Total Sugar Exported at 94 n.t.	Average Australian Price	Average Export Price	Average Price No. 1 Pool Sugar	Average Price all Sugar	Total Value
			£ s. d.	£ s. d.	£ s. d.	£ s. d.	£
1943	486,354	75,650	22 10 6	13 2 6	21 1 3	21 1 3	10,244,000
1944	643,475	208,679	22 2 0	15 0 6	19 18 1	19 16 1	12,744,000
1945	644,624	205,453	21 18 0	16 17 9	20 8 2	20 6 1	13,087,000
1946	512,035	72,578	21 18 0	21 10 0	21 16 11	21 16 10	11,184,000
1947	571,503	95,246	24 0 0	29 12 6	24 16 0	24 18 9	14,251,000
1948	909,896	440,814	23 1 0	28 2 0	24 17 0	25 9 11	23,198,000
1949	896,236	431,254	24 6 0	29 7 6	26 9 3	26 14 10	23,967,000
1950	879,689	395,151	24 11 0	32 16 6	28 4 1	28 5 4	24,866,000
1951	704,043	154,486	33 14 0	36 15 6	34 7 4	34 7 6	24,201,478
1952	934,226	471,008	44 3 0	41 2 0	42 14 2	42 12 3	39,809,705

TABLE B

Table of Mill Peaks and of Proposed Ultimate Peak About 1954/1955

(Tons of 94 n.t. Sugar)

Mill	1929	1939	1949†	1950†	1952	1953	Ultimate Mill Peak about 1954/1955	Best Year's Output
Mossman	14,972	20,000	22,000	22,000	24,000	31,000	31,000	24,567
Hambledon	31,836	36,000	39,600	39,600	41,000	44,000	44,000	41,723
Mulgrave	31,643	36,000	40,100	40,100	40,500	47,500	47,500	46,733
Babinda	31,901	36,000	39,600	39,600	42,500	46,000	46,400	37,966
Goondi	27,034	29,500	32,400	32,400	34,500	38,000	38,000	36,786
South Johnstone	30,979	36,000	39,600	39,600	42,500	47,000	47,000	51,415
Mourilyan	23,630	27,000	29,700	29,700	31,000	34,000	34,000	33,335
Tully	30,930	38,000	42,100	42,100	45,000	47,000	47,000	55,140
Macknade	30,952	34,000	39,900	46,500	48,500	52,000	52,000	48,964
Victoria	32,221	37,500	43,600	49,100	52,000	78,000	82,000	50,672
Invicta	11,736	16,000	18,300	19,100	20,500	30,000	30,000	22,291
Kalamia	26,053	31,000	35,400	35,600	38,000	48,000	48,000	47,602
Pioneer	21,391	26,000	30,100	34,000	35,500	45,000	45,000	42,307
Inkerman	*24,207	31,000	36,800	42,000	45,000	55,000	55,000	54,606
Proserpine	16,650	23,000	26,300	33,000	35,000	43,000	43,000	36,490
Farleigh	16,993	23,000	27,600	32,400	33,500	42,000	42,000	35,288
Racecourse	18,066	24,000	29,000	35,200	36,500	42,000	42,000	37,738
Pleystowe	19,781	24,000	29,200	35,900	37,000	45,000	45,000	39,039
Marian	18,997	24,000	28,600	32,300	33,500	42,000	42,000	36,586
North Eton	9,319	12,000	14,500	15,900	17,500	26,000	26,000	19,290
Cattle Creek	8,791	12,000	13,400	14,100	14,500	20,000	20,000	16,315
Plane Creek	18,233	24,000	28,600	30,800	32,500	42,000	42,000	34,360
Fairymead	15,882	21,000	25,700	28,600	29,500	37,000	37,500	33,345
Qunaba	8,940	10,000	11,200	12,700	13,500	15,500	18,500	14,036
Millaquin	14,443	19,000	24,100	29,600	31,000	35,000	37,000	33,499
Bingera	17,864	23,000	27,800	31,000	31,500	37,000	37,000	33,550
Gin Gin	6,000	6,500	8,000	8,400	9,000	12,500	12,500	9,782
Isis	28,011	27,000	30,000	30,200	31,500	33,000	35,000	34,040
Maryborough	3,862	7,500	9,500	9,500	12,500	14,500	20,000	11,050
Mount Bauple	6,231	6,500	7,200	7,200	—	—	—	—
Moreton	11,586	14,000	16,000	16,000	16,500	20,000	20,000	19,013
Eagleby	280	300	—	—	—	—	—	—
Rocky Point	2,014	2,200	2,700	2,700	2,780	3,500	3,500	2,396
	611,428	737,000	848,600	916,900	963,080	1,152,500	1,169,900	

* Increased by 2,500 tons in 1938.

† Does not include 3 per cent. for Soldiers' Settlement.

†† Subject to provision made for the following being realised:—

(1) Mill crushing capacity;
(2) Assignment of suitable lands; and
(3) Assignments being made effective.

Fig. 1

Spraying of the common reed *(Phragmites communis)* in the Moreton area. This weed pest which is common on low-lying land is not amenable to control by cultivation but can be kept in check by spraying with a mixture of 2,4-D and 2,4,5-T together with a wetting agent. The cane was not adversely affected.

Fig 2

One method of pre-emergence weed and grass control with 2,4-D. The cane rows only are sprayed and the interspaces kept clean by cultivation implements. Note the prolific weed growth in the unsprayed areas in contrast to the clean cane rows.

REVIEW OF THE INDUSTRY

International Sugar Agreement

The year 1952 witnessed the end of the arrangement whereby all Australia's exportable surplus of raw sugar was purchased at a negotiated price by the British Ministry of Food. As from 1953 only 314,000 tons will be purchased by Great Britain at an agreed price, the balance of the 600,000 ton export quota having to be disposed of on an open market but with the advantage of Empire preference. For this reason the Australian producer is interested in the maintenance of a reasonable world price, particularly from 1953 onwards, and it is fortunate that, after several years of discussion, a new International Sugar Conference was arranged for this year.

At a meeting of the International Sugar Council in November, 1952, which was attended by representatives or observers from 27 Governments, the Council requested the Secretary-General of the United Nations to convene an International Sugar Conference to consider the conclusion of an International Agreement. It was suggested that the Conference meet in London in late June or early July, 1953.

At the time of meeting of the International Sugar Council the British Government is reported to have stated that, with regard to Commonwealth producers, the export quotas provided in the Commonwealth Agreement must be regarded as a minimum. Doubtless the irreducible export quotas which were written into the Commonwealth Agreement will not be accepted without argument by other delegates to an International Conference, particularly since so many important sugar producing countries will be seeking outlets for increasing quantities.

Sugar Inquiry Committee

On March 18th, 1952, simultaneous with an announcement of an interim rise of 1½d. per lb. in the retail price of refined sugar, the Prime Minister made public the Government's intention to appoint a Committee of Inquiry into the sugar industry. The Committee, after a particularly exhaustive enquiry in Queensland sugar centres, as well as in Brisbane, Sydney, and Melbourne, submitted an interim report in July, 1952, and its final report in September. On October 9th the Minister for Trade and Customs announced the Cabinet decisions on the Committee's recommendations which, in regard to price, were not unanimous. Cabinet decided on an increase of 1d. per lb. which coincided with the highest recommendation from the Committee. The date of the decision governed what proportion of the 1952 home consumption tonnage would benefit by the increase, since it was estimated that about one-sixth of Australian sales from the 1952 crop had already been made at the old price. The increase of 1d. per lb. retail raised the wholesale refined sugar price from £65/12/10 to £73/16/11 per ton.

Empire Sugar Agreement

It was reported last year that, at the signing of the Empire Sugar Agreement on December 21st, 1951, the export price for 1952 sugar was negotiated. This was £38/10/- stg. per ton and was an increase of £5/12/6 stg. over the previous year's figure. On November 26th, 1952, it was reported from London that the new negotiated price, covering 1953 exports up to 314,000 tons, would be £42/6/8 stg. per ton, an increase of £3/16/8 over the 1952 export price. At the same time the Agreement was extended for a further year, to the end of 1960. This new price commences to operate with the 1953 season's shipments. The excess export sugar, over and above the 314,000 tons, will be disposed of at market prices in the preferential markets of the United Kingdom and Canada, as provided in the long term agreement.

International Society of Sugar Cane Technologists

The Eighth Triennial Congress of this Society met in the British West Indies in April, 1953. A three-weeks' programme covered extensive tours of factories and plantations in Jamaica, Barbados, Trinidad, and British Guiana as well as the proceedings of Conference which were held in Barbados. Some 280 delegates from 23 sugar producing countries attended. The Queensland delegation numbered five and a similar number from the Colonial Sugar Refining Company's staff represented the New South Wales and Fiji industries. This Society, the inaugural meeting of which was held in Hawaiiin 1924—as a section of the Pan Pacific Food Conference—has now held congresses in Cuba, Java, Puerto Rico, Queensland (2), Louisiana, and British West Indies, and the 1956 meeting is scheduled for India. They serve a valuable purpose in promoting discussion and complete exchange of ideas and experiences in all fields of cane sugar technology. The Queensland Society of Sugar Cane Technologists is an offshoot of the parent body, as are the various regional Technologists' Societies throughout the sugar world.

Sugar Industry Expansion

It is now possible to look back over the past few years and to summarise the extent of sugar industry expansion in Queensland. The gross assigned area has increased from 435,393 to 597,844 acres, a rise of 37 per cent. The number of individual cane growing assignments

has grown simultaneously from 7,140 to 8,186 including 252 under the War Service (Sugar Industry) Land Settlement Act. The division of assigned acres, totalling the aggregate quoted above, shows that 33 per cent. of the now assigned acreage is in the north of Townsville districts, 12 per cent. in the Lower Burdekin, 33 per cent. in Mackay, and 22 per cent. Bundaberg and south. Since 1939 when aggregate mill peaks were stabilised at 737,000 tons of 94 n.t. sugar the Queensland peak has been increased by 56 per cent. to 1,152,500.

WORK OF THE BUREAU

Only minor staff changes occurred during the year and the net result was an increase in personnel from 50 to 52. The degree of Doctor of Philosophy was conferred on Dr. J. C. Skinner after two years' genetics study at Manchester University; he has now joined the cane breeding staff at Meringa. The soil analysis team was increased from three to four during the year to cope with the greatly increased demand for fertilizer recommendations. The expansion of lands under sugar cane and the increase in canegrowers to approximately 8,000 has created a need for more extension and advisory officers. Efforts are being made to build up the agronomy and extension staff to the required strength. At the present time all major cane-growing districts are served by advisory officers—although not at the desired strength—with the exception of the Herbert River. Following a request from the Cane Growers' Executive in that area an Adviser will be stationed there permanently, late in 1953. A staff residence is being constructed for the purpose. In furtherance of the Bureau's policy of providing staff houses where required a residence has also recently been purchased at Nambour.

The oft-repeated advice to canegrowers to make better use of the Bureau's free soil-testing and fertilizer-recommendation service bore fruit during the year. The sudden rise from 434 to 1,308 farmers' soil samples initially caused some delays in laboratory work but the position was rectified by an increase in staff. Some of the increase is attributable to the industry expansion which involved the clearing and planting of much new land. Despite the rising interest in soil testing it is obvious that there is considerable scope for improving fertilizing procedures; only ten per cent. of the industry growers are yet taking advantage of the available service. One of the few ways open to the growers to improve their farm economy is by reduction of the expenditure on fertilizer, and this can, in many cases, be achieved by using the correct type in the recommended quantity.

The export of plant nutrients, in the form of molasses, mentioned in previous reports, continues unabated. The proportion of analysed soil samples showing low potash content is even higher than in the previous year. There is good reason for alarm on the part of the canegrowers of the State when observing a lowering soil potash status simultaneous with a rising use of that fertilizer, while at the same time potash-rich molasses is being sold to other industries.

Several years of field trials directed at evaluating the benefits of liming acid soils have not led to clear cut conclusions. Examination of the accumulated results does not indicate that liming for the correction of acidity has appreciable effects in ultimate crop yield even on very acid soils. It is difficult to assess, however, what the indirect effect may be due to improvement in physical condition and drainage. The trials do emphasise the high tolerance of the sugar cane plant to acid soil conditions.

The permanent trash trial on Bundaberg red volcanic loam still fails to show any return from the treatment in terms of cane or sugar per acre after 20 years of conservation. The trial is to be amended in some respects to ascertain whether the beneficial effects of trash blanketing, claimed in some other countries, are due in part to potash content of the decomposing material. The new trash trial at Mackay Experiment Station has now completed its first rotation but to date there are no marked effects from the material. It will be continued as a permanent experiment.

The ratoon stunting disease problem was advanced during the year to the top of the priority list of Bureau investigations. Much important progress in our understanding of the disease was made. In particular the relative sensitivity of a range of varieties to hot water treatment was studied following certain unexpected effects on buds and root primordia as a result of immersion in hot water. A vigorous campaign, instituted by the Bureau, and carried out by most Cane Pest and Disease Control Boards has ensured large plantings of hot water treated stocks of all major varieties, and a large tonnage of clean plants is ensured for 1954 plantings. At the same time all Experiment Station plantings have been subjected to a similar treatment.

Overseas visits by the Director and a Bureau pathologist made possible the identification of the same disease in a considerable number of other sugar producing countries, and there is now little doubt that the affection is world wide in distribution. More evidence has accumulated to confirm that ratoon stunting disease is a prime factor in the deterioration in yield of cane varieties and there is every indication that hot water treatment of diseased plants will result in a return of the variety's original vigour. The maintenance of the cane in clean condition involves only a modicum of care and the observance of simple hygiene.

In view of the importance of an all-out effort to control ratoon stunting disease the programme of work for the field staff was designed to postpone for a year much of the normal routine and to concentrate on, among other angles of the problem, the establishment of clean stocks of old and new varieties so that comparative field trials may be planted. It will be interesting in the extreme to observe how older varieties, discarded in favour of higher yielders, behave after hot water treatment when grown alongside present day commercial standards. In particular, interest will attach to the relative performance of P.O.J. 2878 which contributed so much to the sugar economy of South Queensland in the thirties and which has since deteriorated as the result of ratoon stunting disease.

Worthy of note in the field of cane varieties is the successful extension of the Mackay bred Q.50 into so many other districts, both north and south. Normal expectation and experience in cane breeding is that a variety which suits the environment in which it is bred has limited, if any, use elsewhere. Q.50 promises to become an important variety in the Mossman to Mulgrave belt, in the Ingham Line-Giru district, and in all parts of southern Queensland; the indications are that it will top the varietal census for the State in the 1953 season. The extension of Q.57 propagation in northern and Lower Burdekin areas will lead to the addition of a further valuable variety to the approved lists. In the south the distribution of N.Co.310 in the current year will provide an early maturing cane which, with Q.50, should do much to improve general crop quality.

The application of BHC for grub control during the year covered 44,000 acres of plant and 15,500 acres of ratoon cane. The very low grub populations experienced during the period suggest that the widespread use of the insecticide is having a marked effect on beetle emergences and flights, and reinfestation of fields. So low have the populations become that difficulty is experienced in assessing the value of newer insecticides which the Bureau is attempting to test in the field. The use by some growers of amounts of BHC in excess of the recommended dressings is disquieting. The standard dressings are ample to ensure protection against damage over the period of three crops, and the growers concerned are not only involving themselves in higher than necessary expenditure but exposing their crops to the risk of accumulative toxic effects. Research work is not yet sufficiently advanced to show whether the cane plant can tolerate excessive dressings of BHC over a period of years.

The 1951 cane collection made in New Guinea is now being planted on all Experiment Stations in comparative trials against district standard canes, and it is proposed to extend the plantings with some of the more promising types on to other soil types and in other districts. Many of the varieties have already demonstrated a marked tendency to lodge even in small crops and this characteristic will be sufficient in itself to eliminate them as commercial canes. Several which arrowed during 1953 have already been utilised in the breeding programme.

The advantage of velvet bean as a green manure, fallow crop are still being emphasised to growers, and they are, to the extent of the seed available, replacing cowpeas and other legumes throughout the industry. The inability to obtain sufficient seed is still an obstacle to large scale extension of plantings. Growers who have experienced the serious losses which occur from wilt and bean-fly in cowpea plantings are disinclined to plant anything except velvet beans which have, to date, exhibited marked resistance to both affections.

An effort is being made to locate cowpea varieties which are resistant to *Phytophthora* wilt. Small seed stocks of 14 varieties were obtained for testing; one, C.P.I.12377, appears, on first trial, to be highly resistant and five others show a degree of resistance in addition to possessing favourable agronomic characters. Seed multiplication of some fifty varieties is being carried out so that this testing may be furthered.

The spraying of organic mercurial solutions on to cane setts dropping from the cutter planter is, in some districts, supplanting the normal dipping procedure. The spraying apparatus, however, requires constant attention and supervision, particularly when the solution is recirculated; dirt and small fibre particles can, by causing blockages in jets, result in ineffective protection against pineapple disease. The latest machines devised for dipping incorporate a circular saw for plant cutting, a mercurial bath and elevator for plant treatment and automatic bagging of the plants; all are incorporated in the one power-driven unit.

The usual varietal trial programme was carried out during the year and the result made available to growers in the April, 1953, Quarterly Bulletin.

MANUAL OF CANE GROWING

The Queensland Cane Growers' Handbook, published by the Bureau in 1939, became unavailable by 1952. Owing to the need which still existed in the industry for a text book dealing with cane growing problems it was decided to compile a new publication to cover all phases of cane production from land clearing to mechanical harvesting and loading. At the same time such subjects as cane varieties, weed control, pest eradication, and the treatment of diseases, which had become out of date in the previous publication, were written with due regard to the latest experience in Queensland. The new Manual of Cane Growing was published in June,

1953, and the Bureau purchased sufficient copies to allow of a free issue being made to every cane grower in the State as well as being sent to all mills and to a number of other persons directly or indirectly associated with the industry.

The publication should fill the needs of the growers for a considerable period and should be of particular assistance to new growers who have entered the industry only in recent times.

SUGAR EXPERIMENT STATIONS BOARD

During the year 1952-53 four meetings of the Board were held at Brisbane on August 4th and December 4th, 1952, and March 19th and May 28th, 1953. Mr. W. L. Poustie, who had been the cane growers' representative on the Board since its inception in July, 1951, resigned in January, 1953. He was replaced by Mr. L. G. Scotney.

Arrangements were made for the transfer of all Bureau real property to the Board; it had previously been held in trust by the Public Curator and the Dept. of Agriculture and Stock. During the period a valuation was made of all land, buildings, machinery, equipment, furnishings, and stock; these included land and buildings at Meringa, Innisfail, Ayr, Mackay, Bundaberg, and Brisbane.

The Board gave consideration to a proposed plan of expanded services to the industry and laid down certain essential requirements for numerical staff increases. It was felt in particular that seedling work required the services of a full time officer on each Station and that extension and advisory services to growers justified the enlargement of personnel employed on those duties. The numerical staff strength attached to some Stations, eleven at Meringa and eight at Bundaberg, makes necessary some building additions or alterations to improve accommodation and working facilities.

A staff superannuation scheme was inaugurated during the year.

The Board, at its March, 1953, meeting, decided to reduce the levy per ton of cane from 4½d. to 4d. in view of the large crop in prospect. The income from levy, Government subsidy, and sale of Experiment Station cane will still allow of a certain amount being transferred to a reserve fund after providing for the year's expenditure.

Members of the Board decided that the Bureau should be represented at the 8th Congress of the International Society of Sugar Cane Technologists in the British West Indies in April, 1953. Accordingly the Director, Mr. N. J. King, and one of the mill technology division, Mr. C. B. Venton, proceeded to the Congress on March 30th. In addition to attending the sessions of the conference and visiting various islands of the British West Indies, Mr. King looked into technical sugar matters in Hawaii, Colombia, Florida, and South Africa, while Mr. Venton visited sugar factories and manufacturing plants in Hawaii, Louisiana, Florida, Puerto Rico, Cuba, and Fiji.

The ratoon stunting disease problem in Queensland, and the potential threat which it presented to local production, was responsible for the Board's decision to send a pathologist overseas to study at the virus school at Berkeley University, California. Mr. D. R. L. Steindl spent some three months at that centre and, in addition, at the request of the sugar industries of Louisiana and the British West Indies, visited those countries. It was confirmed that the same disease, discovered originally in Queensland, was present in those countries.

PUBLICATIONS BY BUREAU STAFF

King, N. J., Mungomery, R. W., and Hughes, C. G., Manual of Cane Growing.

To the **Proceedings** of the International Society of Sugar Cane Technologists

Buzacott, J. H., The Parental Performance of Some Sugar Cane Varieties in Queensland.

Buzacott, J. H., and Hughes, C. G., Cane Collecting in New Guinea in 1951.

Clayton, J. L., Some Features of Milling in Queensland.

Hughes, C. G., Red Rot of Sugar Cane.

King, N. J., and Steindl, D. R. L., The Relationship between Varietal Yield Deterioration and Ratoon Stunting Disease.

Mungomery, R. W., The Rise and Fall of the Sugar Cane Weevil Borer Pest in Queensland.

Steindl, D. R. L., Sclerospora Disease of Sugar Cane.

Vallance, L. G., and Leverington, K. C., The Effect of a Synthetic Soil Conditioner (Krilium) on the Aggregation of Some Queensland Soils.

Venton, C. B., Pans and Pan Boiling in Queensland.

To the **Proceedings** of the Queensland Society of Sugar Cane Technologists

Bates, G., Some Aspects of Pre-Emergence Spraying with 2,4-D.

Buzacott, J. H., Types of Badila.

Claire, A. G., Further Experiments on the Keeping Qualities of First Expressed Juice.

Clayton, J. L., Some Thoughts on High Grade Boiling Policies.

Doolan, A. D., The Aconitic Acid Content of Queensland Molasses.

Hitchcock, B. E., Investigations into the Micro-fauna of Sugar Cane Soils and their Susceptibility to BHC.

Knust, H. G., Notes on the Heat Treatment of Cane Plants at the Bundaberg Sugar Experiment Station.

Skinner, S. O. W., A Review of Modern Agricultural Developments and the Record 1952 Crop in the Innisfail and Tully Areas.

Vallance, L. G., Tilth—Some Features of its Control.

Venton, C. B., Notes on the Drying of Raw Sugar.

Technical Communications

Hughes, C. G., The Diseases of Saccharum in New Guinea.

Buzacott, J. H., Insects Associated with Sugar Cane in New Guinea.

Venton, C. B., The Use of Active Magnesia in Clarifying Cane Juices.

Operations Reports

Sugar Drying Tests at Tully Mill.

One News Letter and four issues of the Cane Growers' Quarterly Bulletin were distributed.

APPENDICES

The Bureau levy for the 1952 season was made at the rate of 4½d. per ton of cane, this amount being paid in equal proportions by miller and grower. Receipts and disbursements for the year under review are shown in Appendix I. For the benefit of readers outside Queensland the derivation of the c.c.s. formula is given in Appendix II.

Appendix I

"The Sugar Experiment Stations Acts, 1900 to 1952"

Statement of Receipts and Disbursements of Funds of the Sugar Experiment Stations Board for Period 1st JULY, 1952, TO 30th JUNE, 1953.

Receipts	£	s.	d.	Disbursements	£	s.	d.
To Balance, 1/7/52	23,429	1	1	By Salaries	46,373	9	11
„ Assessment	128,284	8	5	„ General	66,767	2	7
„ Endowment	7,000	0	0	„ Ayr	5,350	10	5
„ Ayr	1,685	9	6	„ Bundaberg	4,174	15	4
„ Bundaberg	1,776	11	11	„ Mackay	5,152	4	10
„ Mackay	3,088	17	11	„ Meringa	8,611	12	0
„ Meringa	2,841	7	11		£136,429	15	1
„ Sundries	1,662	13	11	Balance, 30/6/53	33,338	15	7
	£169,768	10	8		£169,768	10	8

Appendix II

C.C.S. FORMULA

$$\text{C.C.S. in cane} = \text{Pol in cane} - \frac{\text{Soluble impurities in cane}}{2}$$

In practice, per cent. C.C.S. is calculated by the empirical formula—

$$\text{C.C.S.} = \frac{3P}{2}\left(1 - \frac{5+F}{100}\right) - \frac{B}{2}\left(-1 - \frac{3+F}{100}\right)$$

where—

P = pol in first expressed juice.
B = brix in first expressed juice.
F = fibre in cane.

Division of Soils and Agriculture

Soil Technology and Experiment Stations Report

(By L. G. VALLANCE, Assistant Director)

ANALYTICAL WORK

The following is a summary of the analytical work performed at the Brisbane Laboratory for the period 1st July, 1952, to 30th June, 1953.

Soils	No. of Samples
Farmers' Samples	1,308
Fertility Surveys	156
Experimental Plots	59
Miscellaneous	
Waters	17
Mill By-products	5
Other Samples	14
	1,559

A marked feature of the analytical work carried out during the period was the very large increase in the number of soil samples received from farm properties, 1,308 samples being analysed compared with 434 the previous year. This greater interest on the part of growers in soil analysis is pleasing to record since it is felt that the free soil testing service given to farmers is of considerable value to the industry, particularly in view of the present very high price of fertilizer. The expansion of the industry and the assignment of new areas also involved an increased amount of testing and much useful help was provided by the soils laboratory in the determination of the preliminary fertilizer treatments required for these new lands. In general the application of both phosphate and potash was necessary in most of the new assignments notwithstanding the fact that the majority of the samples were from virgin land. Because of the increased volume of work involved in this respect further studies on the decomposition of organic materials and foliar diagnosis had, of necessity, to be postponed.

The summary given in the following table indicates that the emphasis was again on potash deficiency, 53 per cent of the samples being deficient in this plant food as compared with 38 per cent. which were low in available phosphate. Fertilizer and liming recommendations were sent to all growers who forwarded soil samples for analysis.

District	Phosphate			Potash			No. of Samples
	Low	Fair	Good	Low	Fair	Good	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent	Per cent.	
Mossman-Babinda	28	7	65	52	25	23	315
Innisfail	39	18	43	43	21	36	306
Ayr	3	3	94	13	5	82	63
Mackay	38	19	43	58	20	22	297
Bundaberg	48	15	37	59	15	26	406
Southern	49	13	38	74	10	16	77
Totals	38	14	48	53	18	29	1,464

Fertilizer Trials

Factorial fertilizer trials of the usual type involving three levels of nitrogen, phosphoric acid, and potash were harvested in the Babinda, Mundoo, Isis, and Nambour districts. The granitic gravel soil in the first-mentioned area responded very well to sulphate of ammonia and an increase of 2½ tons of sugar per acre was obtained by an application of 400 lb. per acre of this fertilizer. The Mundoo and Isis trials were laid down on red volcanic soils and both showed the typical response to potash which is characteristic of this soil type. The alluvial brown clay loam at Nambour was found to be mainly deficient in nitrogen. None of the trials responded to the application of superphosphate.

An interesting demonstration trial using different levels of a complete NPK mixture was carried out at South Johnstone. This soil had been heavily fertilized for many years, a good green manure crop had been ploughed in prior to planting, and the soil analysis indicated that no response could be expected from the application of phosphoric acid or potash. The yield figures showed that heavy dressings of fertilizer on a soil in this condition are completely unjustified.

At South Johnstone and Mourilyan, trials comparing the effect of early and late applications of sulphate of ammonia on ratoon cane were also harvested. From the results obtained it would appear that, in these districts, in which good growing conditions are normally maintained throughout the spring months, the ratooning mixture plus the top dressing could advantageously be applied as a combined application in the one operation at ratooning. Further trials of a similar nature are in progress to determine whether this will hold good in the majority of cases.

Lime Trials

The first ratoon crops of seventeen replicated lime trials were harvested and the results were very similar to those of the plant crops which were reported last year. It is planned to take these trials to second ratoons before an assessment of the overall value of lime is made. The mean yields are given below since these figures indicate the magnitude of the differences due to the various treatments.

Treatments (per acre)	District averages (tons cane per acre)			
	Cairns (5 trials)	Innisfail (5 trials)	Mackay (4 trials)	Bundaberg (3 trials)
2 tons lime broadcast	23.64	37.61	23.42	36.89
10 cwt. lime in drill	24.58	37.61	22.76	37.22
5 cwt. lime in drill	23.23	37.76	22.09	35.84
No lime	23.06	36.40	21.82	36.82

Clay Mineral Studies

The work begun last year to investigate the nature and kind of clays present in sugar cane soils was continued. Most of the major soil types in the various districts have been examined by the differential and thermal analysis method in conjunction with cationic exchange capacity, crystal lattice water, and non-replaceable potash determinations. Present evidence indicates that kaolin minerals predominate in many of the soils and as previously reported this group is characterised by naturally good physical conditions. Further studies with some intractable soils from Home Hill, Mackay, and Bundaberg indicate that these contain a greatly different type of clay to that of the kaolinitic group. Although it has not yet been possible to identify the particular mineral present it is thought to be a montmorillonoid of the nontronite type. Gibbsite was again found to be an important constituent of the clay fraction of the soils from the northern districts.

Studies on Soil Physical Condition

The effect of the application of Krilium (Formulation 9) to various soils was further studied in the laboratory. Measurement of the water stable aggregates greater than .5 m.m. indicated that the conditioner was capable of bringing about a very great increase in this respect. However, as was reported last year, it was again not possible to measure any difference due to treatment in further samples of heavy Burnett River alluvial. A similar reaction was obtained on a heavy black clay of basaltic origin in the Maroondan area. The clay minerals of both of these soils were predominantly of the non-kaolinitic type.

A number of plots have been set out in several sugar districts in which Krilium has been applied at the rate of 400 lb. per acre. Because of the difficulties involved, it is not intended to attempt laboratory determinations in the assessment of the differences due to treatment but to rely upon field observations particularly during cultural operations to decide whether the soil conditioner has brought about a worthwhile improvement.

NORTHERN SUGAR EXPERIMENT STATION

(G. BATES, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

Rainfall during the year July, 1952, to June, 1953, was 83.98 inches, which is above the average of 74.26 inches for the past 29 years. The spring rainfall was evenly distributed and while falls for November and December were less than usual, sufficient rain fell to keep the young cane growing nicely. The wet season rains commenced in January and during the month 36.97 inches fell which was over twice that normally received; the February and March falls were close to average. Only local flooding occurred and no appreciable damage was done to cane crops. The wet season rains ceased in March and the April, May, and June falls were below normal.

Weather conditions were such as to enable land to be prepared for early planting and growers were able to complete much of the planting prior to the commencement of the crushing season.

Early growth of cane was quite satisfactory, but was rather slow during January, February, and March owing to the number of cloudy days in those months. However, as a result of the mild early winter weather, some of the crops made much late growth. Although expectations of tonnages have not been realised and previous estimates have been reduced, it appears likely that a record crop will be harvested in North Queensland in 1953.

The treatment of cane setts with organic mercurial sprays and dips as a protection against pineapple disease has increased considerably. Evidence of its effectiveness is reflected in the many excellent germinations obtained as a result of its use. The time is fast approaching when the use of mercurial compounds will be standard practice as is the case with BHC for protection against grub damage.

Arrowing has not been as free or as early as in other years.

The following tables show the rainfall records taken at the Northern Sugar Experiment Station over the past 29 years and an abstract of other meteorological observations.

Rainfall Records at Northern Sugar Experiment Station for the past 29 Years

Year	Rainfall in Inches	Year	Rainfall in Inches
1924-25	82.86	1939-40	82.10
1925-26	49.02	1940-41	80.59
1926-27	80.34	1941-42	41.55
1927-28	72.46	1942-43	64.60
1928-29	92.83	1943-44	52.92
1929-30	69.99	1944-45	120.34
1930-31	75.62	1945-46	63.95
1931-32	61.87	1946-47	35.24
1932-33	90.02	1947-48	69.12
1933-34	119.09	1948-49	85.77
1934-35	58.22	1949-50	83.50
1935-36	87.64	1950-51	67.68
1936-37	49.54	1951-52	52.86
1937-38	53.28	1952-53	83.98
1938-39	126.79		

Average for 29 years = 74.26 inches.

Abstract of Meteorological Observations made at Northern Sugar Experiment Station, Gordonvale, from 1st July, 1952, to 30th June, 1953.

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Temperature 9 a.m.	Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1952											
July	0·46	8	85	76	81·5	65	41	59·7	21·8	70·4	80
August	2·36	8	89	76	83·9	69	40	58·6	25·3	71·9	76
September	1·16	9	92	82	86·5	67	47	60·2	26·3	75·3	77
October	1·66	9	97	82	90·5	77	56	67·2	23·3	80·4	74
November	2·86	8	98	89	93·5	76	65	70·8	22·7	83·4	75
December	1·25	6	105	89	95·7	76	65	71·7	24·0	86·3	68
1953											
January	36·97	23	99	81	89·4	76	69	73·4	16·0	80·6	83
February	15·51	20	96	82	90·8	76	66	73·0	17·8	80·9	87
March	16·37	20	95	78	86·9	74	61	70·8	16·1	79·2	86
April	3·45	10	92	80	87·1	74	54	65·1	22·0	76·8	82
May	0·84	5	91	77	84·2	69	41	57·4	26·8	71·6	80
June	1·09	6	86	75	81·2	67	46	56·2	25·0	68·2	84
Totals											

WORK OF THE STATION

Seedling Raising and Selection

Fuzz was planted in the glasshouse at the end of July and subsequently 8,622 original seedlings were planted in the field at the end of October. These will be known as "N" seedlings. Seedling selection in the 1952 original "M" series resulted in the replanting of 157 seedlings in 40-sett plots.

From the 30-sett plots of the previous year ("K" series) 37 varieties were selected for planting in a yield-observation trial using Pindar as a standard. From the first ratoon yield-observation trial of "I" and "J" seedlings, three "I" seedlings and two "J" seedlings were planted in a randomised block trial, with Pindar as a comparative standard.

Importations

The following varieties were received from Brisbane quarantine for breeding work and for trial as possible commercial canes:—

One hundred and fourteen varieties collected in New Guinea during the 1951 Bureau Expedition. B.4098, B.41211, B.41227, M.336, H.39-5803, H.36-7913, H.44-2364, H.40-1184, H.34-3171, H.47-2910, P.R.905, P.R. 902, Pepe Cuca, C.P.43-47, C.P.36-183, C.P.44-155, Co.385, Co.213.

It is intended to plant the New Guinea canes in 40-sett plots during 1953.

Seedling Work at Babinda

Work at this sub-station was continued during the year. Twenty-two "M" series seedlings were selected from the 2-sett plantings and planted out in 40-sett plots using Pindar as a standard. Approximately 900 "N" series original seedlings were also planted out in 2-sett plantings.

Experiments Harvested during 1952 Season

Five seedling trials were harvested during the year. These consisted of a plant trial in the form of a randomised block on Division A3; a first ratoon randomised block on Division A2; a first ratoon randomised block at the Babinda sub-station; a plant yield-observation trial on Division A6; and a first ratoon yield-observation trial on Division A4.

In the plant randomised block H.361, H.231, I.222, I.235, and I.245 were compared with Trojan and harvested at 14 months. In tons of sugar per acre Trojan, I.222, I.235, and I.245 were significantly better than H.231 and H.360, but there was little difference in the yield per acre between the "I" varieties and the standard Trojan. The trial was ratooned and will be harvested again in 1953 as a first ratoon crop. I.245 is a Trojan x Q.39 cross and is a rather late maturer. It is inclined to spread when planted on good soil and its late cover is rather poor. I.235 is a Q.44 x Comus cross. It is a splendid ratooner, although tending to be somewhat thin in the ratoons when growing on poor soils. Its early sugar is quite satisfactory. I.222 is a Pompey x Q.39 cross and has the Pompey habit of growth. It is a thick barrelled cane with a good top and excellent cover. The early sugar content is good and it is a satisfactory cutting cane.

In the plant yield-observation trial, 22 "J" series canes, five "K" series, and P.O.J. 2961 were compared with Pindar. Only J.238, J.217, J.301, J.204, M.63/39, and P.O.J.2961 were equal or better than the standard in sugar per acre. Ten canes (which included the five "K" varieties) had equal or better sugar content than the standard. Most of these lacked vigour but will be tried out further on good land.

In the ratoon randomised block the following canes, viz., H.312, H.250, H.253, H.302, H.365 were compared with Trojan and harvested at 15 months. Only two varieties, H.253 and H.312 compared favourably with Trojan. The other three varieties failed badly in the ratoons, and will be discarded. H.312 is a Trojan x Q.39 cross and while it performed very well as regards sugar per acre it has many undesirable characteristics which will prevent it becoming an approved variety, not the least being its habit of tangling up badly when burnt. H.253 produced 13 tons of sugar per acre over two crops compared with 9.5 tons for the standard Trojan. It is a Q.44 x Comus cross and does well on poor land. It is now being rapidly propagated in all northern mill areas.

In the ratoon yield observation trial, 20 "I" series seedlings and five "J" seedlings were compared with Trojan. Of these I.216, I.252, I.213, J.211 and J.225 were selected for planting out in a randomised block trial in comparison with Pindar. I.216 and I.213 produced almost as much sugar per acre as Trojan while I.252, J.211 and J.225 did a little better.

At the Babinda sub-station a randomised block was harvested as first ratoons. In this trial the varieties I.405, I.421 and I.426 were compared with Badila. While there was no

significant difference between these varieties in tons of cane per acre, I.426 was significantly better than the others in sugar per acre at the 5% level. This cane is a H.Q.426 x Q.27 cross. It has good early sugar and further plantings have been made in the Babinda district.

Ratoon Stunting Disease

To ensure that all cane on the Station will be free of ratoon stunting disease plantings made after August last year were subjected to hot water treatment at 53°C. for 1 hour. Over 100 different varieties were treated, which will ensure clean seed stocks for plantings in 1953. In future all plantings on the station will be made from either hot water treated stocks or from plants hot water treated for 2 hours at 50°C.

Legumes

Fourteen different varieties of legumes were tried out on land subject to waterlogging using Poona pea, Cristaudo, Reeves' Selection, and Mung Bean (*Phaseolus mungo*) as standards of comparison. These varieties were as follows:—

34 C 361 and 37 C 6 from South Africa; Brabham, Purple Hull, Early Red, Buff, Iron, Arlington and Black Eye 5 from U.S.A.; U.S.S.R.3 from U.S.S.R.; C.521 from India; No. 11383 from Gold Coast, Africa; and Groit from Queensland.

Owing to the incidence of extended rains soon after germination all varieties performed poorly with the exception of Mung Bean, which demonstrated its ability to grow under wet conditions. Of the importations, only one, Black Eye 5, showed moderate growth, the rest succumbing quickly. However, none of these varieties could compete with the velvet beans growing on adjoining land and it appears that this is at present the best legume for North Queensland conditions.

Field Day

Field Day was held at Meringa on 14th May under ideal weather conditions. Over 400 growers and other people connected with the sugar industry attended. Visitors were conducted over the Station by members of the Bureau staff. A comprehensive display of tractors and implements helped to make the day a success.

LABORATORY WORK

The following is a summary of cane samples handled during the year:—

Station and trial samples	1,530
Farmers' cane samples	55
Total	1,585

Summary of crops grown on the Station:—

	Tons
Parent canes and trials	580.18
Original Seedlings	84.58
Total	664.76
Plant cane harvested for mill	318.18
Ratoon cane harvested for mill	309.08
Used for samples, plants and breeding work on Station and experimental plots	37.50
Total	664.76

	Acres
Plant cane harvested	9.79
Ratoon cane harvested	10.90
	20.69
Average tonnage per acre	32.13

LOWER BURDEKIN SUGAR EXPERIMENT STATION

(G. A. Christie, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

The year under review has been a particularly favourable one for the Burdekin area, with a comparatively dry spring and early summer, which caused only very slight delays in harvesting the 1952 crop thus permitting uninterrupted irrigation and cultivation of young cane for 1953 harvest. The subsequent wet season of January to March, 1953, gave excellent rain to replenish the underground water supply, without causing appreciable damage by flooding of low lying cane fields. Except for comparatively small areas of exceptionally heavy crops, most of the cane for 1953 harvest is standing erect, for the wet season was characterised by an absence of cyclonic winds.

The early cessation of the wet season allowed an early preparation of land for 1953 planting, and with the warm early autumn conditions, excellent germinations and early growth have generally occurred. The pre-planting treatment of setts with mercurial solution appears to have become part of the normal farm routine on practically all farms in the Burdekin area, though during the past year, the general trend seems to favour the use of the spraying attachment for cutter planters, and the use of the drop planter is more restricted.

Chemical weed control has not been adopted, since mechanical cultivation not only gives speedy and effective weed control, but it also breaks the soil crust which forms on this alluvial soil following irrigation. Weedicides, however, are used on some farms to assist in controlling certain weeds which are difficult to control mechanically. Experiments with some weedicides have been carried out for the control of weeds and grass in irrigation drains, though to date, no suitable weedicide meeting all the requirements has been found. Further work on this subject will be carried out.

Damage by white grubs was negligible, for a comparatively small beetle flight occurred and areas which are normally affected were protected by an application of BHC. Rats, wallabies, coots and giant termites were responsible for small losses in some localities.

A rapid survey of the Burdekin and Giru areas during the latter part of 1952, showed that ratoon stunting disease was widespread, and the establishment of clean seed plots was undertaken by the Station and also by Cane Pest and Disease Control Boards in the area. The active interest by these local Boards in this subject led them to the purchase of comparatively large hot water treatment units, which are capable of treating plants to establish many clean seed plots in the area. It is hoped that within two or three years, sufficient disease-free plants will be available to supply the planting requirements of the entire area.

In order to control ratoon stunting disease on the Station, preparations have been made for all planting material to be used this year to be either hot water treated or come from a previously treated source. In order to facilitate the treatment, a larger dipping unit was purchased and a heating coil has been provided. With this unit, it is expected that between 10 and 12 cwt. of plants will be treated at each immersion.

The district appears to be free from other major cane diseases, though mosaic disease is present on a few farms. By the use of selected planting material and roguing diseased stools, this disease may be eliminated within a few years.

Abstract of Meteorological Observations made at the Lower Burdekin Sugar Experiment Station, Brandon, from 1st July, 1952, to 30th June, 1953

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Temperature 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1952											
July	—	0	82	76	79·4	56	42	49·4	30·0	66·06	58·76
August ..	·10	1	86	79	83·1	68	45	55·5	27·6	72·60	57·91
September ..	·49	1	86	80	84·1	67	53	59·8	24·3	75·95	61·41
October ..	·02	1	91	84	86·8	68	61	63·3	23·5	82·25	59·88
November ..	1·40	5	98	86	92·5	76	60	70·9	21·6	83·77	62·90
December ..	1·35	4	99	81	92·0	78	65	72·8	19·2	83·31	60·04
1953											
January ..	30·74	21	93	78	86·3	77	68	72·5	13·8	81·19	76·11
February ..	10·09	13	94	81	88·3	78	68	72·0	16·3	81·13	79·59
March.. ..	2·27	7	92	81	87·2	73	61	68·5	18·7	80·07	71·14
April	3·73	2	90	84	86·7	71	61	64·3	22·4	78·36	73·00
May	·05	1	90	77	82·6	68	41	54·3	28·3	70·85	57·50
June	—	0	85	73	79·4	62	41	51·9	27·5	66·96	66·09
Totals ..	50·24	56									

WORK OF THE STATION

Experiments Harvested During 1952 Season

The small area under crop for 1952 harvest consisted almost entirely of seedlings and other new varieties together with a limited area of standard varieties, almost the entire crop of the latter being used for the 1952 Station planting.

One varietal trial harvested in August, 1952, contained the following varieties: 40 SN 1133, Q.57, B.331, G.324, G.323, G.208, G.237 and the standard SJ 16. 40 SN 1133 produced the heavier crop in tons of cane per acre, but it took second place to Q.57 in tons of sugar per acre.

Station Developmental Work

Further development of the Station was proceeded with during the year and in contrast to the 1952 harvest of 420.42 tons from 10.22 acres, the Station 1953 harvest is estimated at 1150 tons from approximately 26.5 acres. This tonnage will be obtained from the following plantings:—

(1) 6084 original seedlings.

(2) Plant cane seedlings in their different stages of trials.

(3) Plant cane propagation plots of miscellaneous varieties.

(4) BHC toxicity trial in which the effect at different amounts of crude benzene hexachloride is being compared with that of the refined gamma isomer.

(5) Plant cane weedicide trial in which strips treated with 4 lb. per acre of 2,4-D gave effective weed and grass control in the early stages, but were rendered less effective following irrigation.

(6) Plant cane trial to investigate different phases of ratooning. This trial was originally planted in 1950, but results in 1951 were irregular due to uneven watering and the field was ploughed out and regraded. After a heavy crop of velvet bean, the trial was replanted in 1952, but at this time, ratoon stunting disease was not known to be present in the Burdekin area and untreated plants were used. As a result, the trial will again have to be abandoned after harvest, though soil variability has been appreciably reduced in the second crop.

(7) A field of first ratoons which includes a varietal trial mentioned earlier in this report, and many other varieties selected from Station seedlings and introduced from other countries.

During the year the office and laboratory building was completed, and the planting of trees, shrubs and lawns was commenced to improve the appearance of the building area. Since no glasshouse facilities were previously available on this Station, cane seedlings have been raised at the Northern Sugar Experiment Station and forwarded to Ayr by rail for transplanting to tubes. However, a prefabricated aluminium frame glasshouse has now been erected and this will enable all seedling raising to be done at this centre in future.

Land preparation for the 1953 planting was completed during the autumn period, and apart from the normal preparation, a considerable amount of levelling was necessary to ensure suitable gradients for irrigation. The area thus prepared for planting totals 14.25 acres.

Seedling Work

It was decided to delay seedling selection until after mills in the area had commenced crushing, and since almost all of the 1953 planting is closely associated with seedling work, no autumn planting was undertaken on the Station this year. However, a small amount of planting had been completed at the end of June, and this included the setting out of 80 seedlings selected from the "N" series original seedlings in 40-sett plots together with a suitable number of plots of standard varieties. In addition, almost 5,000 seedlings had been transplanted from tubes, and at a later date this number will be increased to 6240, which is the capacity of the field.

Apart from the 80 selections from the "N" series original seedlings, 24 "M" series seedlings were selected from 40-sett plots for planting in a yield observation trial, while 4 "L" series seedlings will be taken from the yield observation trial for planting in a randomised block trial.

Variety Introduction

Early in October, 1952, 76 varieties from the 1951 NG series were received and planted in a small plot to provide stocks of these canes for further testing. The following were also received from Brisbane quarantine house: Q.51, Q.55, H.47/2910, H.39/5803, P.R.902, P.R.905

and M.336. All of the above will be included in 40-sett plots for 1953 planting. The isolation plot at Clare has been maintained and this provides an excellent checking point to prevent the introduction of any diseases which may occur in other parts of the State.

Plant Distribution

A distribution of Q.50 was made in the Giru area with the assistance of the district Cane Pest and Disease Control Board. The release of the variety Q.57 in the Burdekin and Giru areas has been delayed to allow all stocks of this variety to be hot water treated, so that when released next year, the variety should be free from ratoon stunting as well as other diseases.

LABORATORY WORK

The following is a summary of the c.c.s analyses carried out during the year:—

Station maturity and trial cane samples	64
Farm trials	145
Total	209

Summary of crops grown on the Station:—

	Tons
Plant cane harvested for milling	292.22
Ratoon cane harvested for milling	97.80
Cane used for plants	30.40
Total	420.42

	Acres
Area plant cane harvested	6.78
Area ratoon cane harvested	3.44
Total	10.22
Average tonnage per acre	41.14

CENTRAL SUGAR EXPERIMENT STATION

(C. G. Story, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

Excellent seasonal conditions which assured the growth of the cane crop were experienced in the Central district from February, 1952, and crop prospects for the crushing were further enhanced by good rainfall in June. Following this rainfall very good germinations were obtained in the July-September planting. Harvesting conditions were ideal with blocks producing crops over the estimate made earlier in the year. Warm conditions occurred at periods throughout September, 1952, and the young plant cane stooled well and harvested blocks ratooned vigorously.

Beneficial rain was registered in a number of districts during October and some early plant cane was out of hand by the end of the month, at which time it was evident that there were prospects for a record district crop in 1953. Summer conditions were experienced with high daily temperatures and these continued in November with excellent growing conditions prevailing in some parts of the district. Rainfall, variable and patchy, occurred in the early part of the month, Kuttabul receiving 385 points in 2 hours from a freak storm which was accompanied by large hail. Following a week of intense heat, relief was obtained with heavy soaking showers from the 23rd to 25th, when district falls varied from 112 to 368 points. There was a continuation of hot weather in December when varying small amounts of rain were received, some storms being accompanied by heavy hail.

The annual rainfall for 1952 at the Experiment Station was 4405 points on 97 days, the driest since 1948 and from the 1st July to 31st December, only 804 points were registered on 30 days. However, this was followed by heavy rainfall in January, 1953, and one fall of 829 points on the 25th flooded portion of the Station. The district recordings for January varied from 22 to 27 inches. All crops made excellent progress and at the end of the month most of the cane except late cut ratoons was out of hand.

Following the January rains, the strong sunshine during the first week in February was beneficial to the whole district. The alternation of rain and sunshine in this month maintained ideal conditions for cane growth, crops were much further advanced than at the corresponding period in 1952, and it was now apparent that there would be a record crop for harvesting during 1953.

The total rainfall for March, 1953, was well below the average but widespread, though variable, falls were received on the 12th April, the heavier rainfall damaging some fallow blocks. Good germinations were obtained from early planted fields of cane.

Daily temperatures dropped in late May, when there was a general cold snap in the area. Light frosts were recorded and Pinnacle and Gargett areas had frosts on six consecutive nights. District falls of rain from a half to one inch assisted the standing crop to maintain its condition during June, 1953. There were cold nights during the second half of the month and on several occasions the district experienced widespread frosts, particularly at Flaggy Rock, Plane Creek Valley, Pioneer Valley, and along the North Coast railway to Bloomsbury.

The practice of treating cane setts with mercurials increased considerably during the year in the Mackay area and spraying units attached to cutter planters have largely replaced dipping outfits.

The cane killing weed "Striga" affected a number of areas of new land brought under cultivation and also some older blocks. Satisfactory control was obtained with the weedicide 2,4-D.

Locusts, *Locusta migratoria,* appeared in small localised areas from Carmila to Proserpine. BHC proved effective against bands of these young hoppers, which emerged at various periods from January to April, 1953. Flights of greyback and frenchi beetles were noted towards the end of December, 1952. There was a sporadic infestation of third stage frenchi grubs in those areas subject to this pest and damage was severe. Heavy flights of greyback beetles occurred during early January, 1953, and feeding trees were defoliated. BHC was applied to 3,190 acres for protection of the 1953 crop. Larvae of a species of *Rhyparida* and a small Scarabaeid beetle caused minor damage to shoots of young plant cane during spring and early summer of 1952. One small area of cane was infested with the army worm, *Mocis frugalis.* Damage by wireworms occurred on new land where the protective application of BHC was omitted.

An intended distribution of C.P.29/116, Q.56 and Q.58 was cancelled to allow hot water treatment and propagation of clean stocks of these varieties free from ratoon stunting disease.

Annual Rainfall since 1935 at the Central Sugar Experiment Station, Mackay

Year	Rainfall (inches)	Year	Rainfall (inches)
1935-36	99.57	1944-45	33.53
1936-37	64.21	1945-46	68.52
1937-38	47.21	1946-47	48.09
1938-39	61.29	1947-48	38.40
1939-40	82.86	1948-49	46.95
1940-41	73.71	1949-50	85.48
1941-42	57.75	1950-51	107.63
1942-43	76.13	1951-52	41.68
1943-44	58.67	1952-53	56.58

Average for 18 years — 63.79 inches

Abstract of Meteorological Observations made at the Central Sugar Experiment Station during period 1st July, 1952, to 30th June, 1953.

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Temperature 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1952											
July	0·53	3	77·5	64·5	72·72	58·5	35·5	49·3	23·42	63·17	74·8
August	1·31	4	84·0	68·0	76·89	64·0	39·5	53·97	22·92	67·69	72·4
September	0·97	7	88·5	71·0	79·75	69·5	40·5	56·9	22·85	73·26	65·5
October	1·71	6	93·5	77·0	83·95	70·5	48·0	63·88	20·07	78·31	63·6
November	1·81	6	94·5	82·5	90·26	74·5	61·0	68·38	21·88	84·36	56·0
December	1·71	4	97·0	84·5	90·43	76·5	66·5	70·59	19·84	84·70	59·72
1953											
January	25·82	21	93·5	78·5	84·09	74·5	65·5	70·98	13·11	79·61	76·7
February	11·90	14	88·5	75·0	84·4	75·5	66·0	70·8	13·6	79·7	76·8
March	3·91	15	88·5	77·5	82·87	72·5	55·5	67·93	14·94	77·22	77·8
April	5·19	6	91·5	77·5	82·75	70·5	56·5	66·45	16·3	75·75	80·85
May	0·82	6	86·0	71·0	78·01	67·0	37·5	52·7	25·31	68·83	68·8
June	0·90	3	82·5	67·5	75·16	64·0	35·0	47·61	27·55	64·18	75·6
Totals	56·58	95									

WORK OF THE STATION

Experiments Harvested during the 1952 Season

Four seedling varietal trials were harvested during the 1952 season. These were a first ratoon yield observation trial with "J" seedlings, introduced varieties and Q.50; a second yield observation trial with "H" seedlings, B.331 and Q.50 ; a second ratoon randomised block trial including three "E" seedlings, Q.47, Q.50 and Q.56 ; a plant yield observation trial at Alexandra. In addition to these a uniformity trial, trash trial, and a ratoon stunting disease trial in isolation were harvested. The results of the above-mentioned trials are briefly summarised below.

The first ratoon yield observation trial on Block B.2 included 29 "J" seedlings and 11 introductions (C.P.34/79, M.63/39, M.76/39, M.112/34, M.134/32, M.165/38, 33 S.N. 1882, 39 S.N. 3821, 39 M.Q. 832, 39 M.Q. 841, Vidar) with Q.50 as the standard variety. This trial produced a good crop of first ratoons, superior to the poor plant crop harvested during 1951. It was harvested in October, 1952, at the age of 13 months. Four "J" seedlings (125, 127, 128, 132) which were comparable with Q.50, were selected and planted in a replicated trial with Q.50 and Q.58 as the standards.

A second ratoon yield observation trial included 26 "H" seedlings and B.331 with Q.50 as the standard variety. The cane on this trial ratooned well and made progress until harvested in August, 1952, at the age of 11 months. Generally this second ratoon crop was better than the previous first ratoon crop. Two of the seedlings, H.106 and H.126, were comparable with Q.50, the first mentioned producing a total yield of 16 tons of sugar per acre for the three crops compared with 16.21 tons for Q.50.

The second ratoon randomised trial included E.119, E.129, E.135, Q.47, Q.56 and Q.50. Following January and February rainfall, the cane made excellent progress for second ratoons. The trial was harvested at the end of November, 1952, at the age of 13 months. Q.50 outyielded all varieties at the 5% level of significance, and all except E.129 at the 1% level of significance. The yields in tons of sugar per acre were Q.50 (4.56), E.129 (3.90), Q.56 (3.56), E.135 (3.44), Q.47 (2.51), E.119 (2.47). Three varieties, E.119, E.129 and Q.56 were affected by ratoon stunting disease. Q.50 gave a total yield of sugar per acre for the plant, first and second ratoon crops of 15.8 tons compared with yields of 13.55 tons for E.129, 13.28 tons for Q.56, 11.70 tons for E.135, 11 tons for E.119 and 9.79 tons for Q.47.

The second ratoon crop of the trash trial was harvested and the block was ploughed. This trial will commence its second cycle with planting in 1953.

A uniformity trial with Q.50 plant cane on two acres of Block C.1 established the area as being suitably uniform for the long range phosphate trial planned for this block.

Alexandra Seedling Plot

Eighteen seedlings were selected from the "K.P." Series, double sett plantings. These seedlings were planted with P.O.J.2878 as the standard variety in 40 sett plots at the Experiment Station.

The plant yield observation trial of "H', "I", "I.P." and "J.P." seedlings was harvested in October, 1952, at the age of 14½ months. Six seedlings, I.102, I.P.180, I.P.181, I.P.184, J.P.164 and J.P.178 outyielded the standard P.O.J.2878 by over one ton of sugar per acre. Selections for further trials will be made from the first ratoon crop.

Seedling Selection

A total of 73 seedlings was selected from the original 1951 seedlings during July, 1952. These, plus 13 introduced varieties, were planted in 40 sett plots on Block B.4. Ten of these seedlings, which have Badila as one parent, were planted with "K.P." selections from Alexandra.

Twenty "K" seedlings, Q.57 and five introductions (Co.331, 41 S.N. 3339, 41 S.N. 3621, P.O.J.2961, and P.O.J.2967) were selected from the first ratoon 30 sett plots, and planted in a yield observation trial with Q.50 as the standard in Block A.5.

Plant Introductions

New varieties introduced from quarantine during the year were: C.P.4347, C.P.44/155, H.39/5803, H.47/2910, P.R.902, P.R.905, Q.51, Q.55, and eighty (80) New Guinea canes from the 1951 collection. Three Barbados seedlings, B.40/98, B.41/211, and B.41/227 were received from the Lower Burdekin Station.

Hot Water Treatment

Forty-four varieties, mainly advanced seedlings, were hot water treated and planted for propagation, during September, in order to provide stocks free from ratoon stunting disease.

Weedicide Trials

A weedicide trial was established on 26th November to observe the effect of various 2,4-D preparations on nut grass. The sodium salt of 2,4-D was superior in all respects to the triethanolamine salt and the ethyl ester.

Seven weedicides were tried against sensitive weed (*Mimosa pudica*) in November, 1952. Very good control was obtained on actively growing sensitive weed by spraying with 2,4-D/2, 4, 5-T mixed esters at the rate of half a gallon per acre followed by a further one gallon per acre after a period of eight weeks.

A trial with a combination of 10 lb. T.C.A., 10 lbs. sodium pentachlorphenate and three gallons of E.F.30 B. per acre against Guinea grass proved that high pressure of application similar to that used in mill tramline control is very important with the above rates per acre.

A long range weedicide trial on couch grass, using basic strengths of 10 lbs. T.C.A. three gallons of pentachlorphenol emulsion per acre; five lbs. T.C.A., 10 lbs. sodium pentachlorphenate and three gallons Timbrol creosote was established. Regrowth has been sprayed with pentachlorphenol and creosote mixtures without T.C.A. to kill topgrowth and T.C.A. will be applied separately during wet weather to kill the roots.

The boom spray was used for chemical control of a number of weeds on Station pastures.

Legumes

Velvet Beans were planted in mid March, 1953, to obtain information on the value of late planting for seed production purposes.

Experiments Initiated during the Year

These included a bagasse trial, a nitro-chalk versus sulphate of ammonia topdressing trial, a long range phosphate trial with rock phosphate and superphosphate, a filter-press mud fertilizer trial, the second cycle of a long range trial with various crop rotations, a soil improvement trial, a small Krilium trial, and a 2,4-D effect on C.C.S. trial. In addition, a ratoon stunting disease trial was planted in isolation.

Fig. 3

Velvet beans are the most favoured green manure crop in all sugar areas. A group of farmers are examining a crop on the occasion of a Sugar Experiment Station Field Day.

Fig. 4

Molasses applied to interspace furrows in a young ratoon crop. A moderate dressing of this material supplies all the potash and nitrogen requirements of the cane.

Field Day

The 1953 Field Day was held at the Mackay Sugar Experiment Station on the 12th May. There was an attendance of 450 canegrowers, who were conducted on a tour of the Station by members of the Bureau staff. A display of implements and tractors was provided by Mackay agencies and manufacturers.

LABORATORY WORK

The following is a summary of the c.c.s. analyses carried out during the year:—

Station	1,267
Farm Trials	480
Farmers' Samples	85
Show Canes	25
Total	1,857

Summary of Crops Grown on the Station

Varieties harvested during 1952 Season:—

	Tons
Q.50	191.12
Seedlings	429.02
Total	620.14
Plant cane harvested	301.74
First ratoon cane harvested	105.93
Second ratoon cane harvested	207.38
Third ratoon cane harvested	5.09
Total	620.14
Total cane harvested for mill	620.14
Used for samples, plants, farm propagation and trials	46.13
Total Crops	666.27
Total acreage harvested	25.65 acres
Average tonnage per acre	25.98 tons

SOUTHERN SUGAR EXPERIMENT STATION

(H. G. Knust, Senior Adviser, Officer in Charge)

METEOROLOGICAL AND CROP GROWTH REPORT

The winter of 1952 was comparatively mild and only three frosts were recorded in July. These, however, severely damaged millable cane in some of the low lands at Wallaville and a few isolated blocks of young cane in the Millaquin area. During the early spring months frosts occurred on two mornings at the end of August, and on one morning early in September. The lowest screen temperature recorded was 36° F. in August. Rainfall was light during the late winter and early spring months.

Good rain was received during October and early in November. However, despite two reasonable falls in December, near drought conditions prevailed from the second week of November to the third week of January. Nevertheless, growing conditions were generally good until mid-December when the continued dry weather began to affect growth adversely. Rain occurred during the third week in January with a resulting improvement in growth. This was well maintained throughout the autumn with temperatures slightly above average.

Early winter conditions for 1953 were mild and growth was good during this period. Sharp frosts occurred in the third week of June which cut back much of the autumn plant cane in all mill areas and damaged mature cane on the low lands in the Bingera and Gin Gin mill districts.

The 1952 crushing was notable for the fact that yields were better than appeared likely from estimates made earlier in the year when the district was suffering severely from drought. Late rain induced growth and harvestable cane grew throughout the crushing season. In consequence, all mills with the exception of Isis crushed reasonable tonnages, but C.C.S. figures were generally somewhat low.

The first arrows of the present season's crop were noticed on the coastal fringe during the third week in May but up to the end of the period under review arrowing has been extremely sparse.

Pre-planting treatment of cane setts with mercurials is rapidly becoming standard farm practice, and dipping methods vary from small dipping tanks which hold either a few bags or wire baskets of plants, to large tanks capable of holding about one ton of cane. In these latter units the plants are handled in bags with rope slings and loaded by a mobile crane. In one instance a combination circular saw—dipping tank—conveyor belt outfit is used.

Moderate emergence of cane beetles (*L. trichosterna* Lea and *P. furfuracea* Burm) occurred during early October. Grub damage, although not extensive, varied from light to severe and fumigation with carbon disulphide was practised where it was considered economic to fumigate. Stools were ploughed out in some fields where damage was severe and widespread.

Foxes caused damage to some mature crops, particularly in the soft rinded canes, and one grower at South Kalkie effectively protected his field with an electric fence.

Ratoon stunting disease was found in all commercial canes and the Cane Pest and Disease Control Boards at Bundaberg and Childers took extensive measures to establish clean planting material for growers. District sugar mills co-operated by installing hot water treatment plants for use by the Boards. On the station steam heated hot water equipment was set up and all cane was treated before planting out on either the station or farm trial plots. Steps were also taken to provide treated stocks of all promising seedlings at present undergoing trial. Experiments were carried out to investigate the effect of varying temperatures and duration of immersion on the viability of planting material.

Rainfall Records at the Southern Sugar Experiment Station, Bundaberg, 1914-1953

Year	Rainfall (inches)	Year	Rainfall (inches)
1914-15	31.99	1927-28	74.69
1915-16	28.54	1928-29	31.16
1916-17	58.08	1929-30	43.16
1917-18	49.85	1930-31	47.19
1918-19	24.24	1931-31	22.83
1919-20	28.20	1932-33	36.81
1920-21	45.16	1933-34	71.45
1921-22	44.97	1934-35	44.01
1922-23	37.14	1935-36	44.24
1923-24	34.16	1936-37	31.65
1924-25	50.96	1937-38	44.40
1925-26	37.62	1938-39	41.01
1926-27	68.18	1939-40	41.69

Rainfall Records at the Southern Sugar Experiment Station, Bundaberg, 1914-1953 (Continued)

Year	Rainfall (inches)	Year	Rainfall (inches)
1940-41	43.26	1947-48	57.76
1941-42	33.52	1948-49	40.18
1942-43	40.75	1949-50	59.31
1943-44	45.22	1950-51	50.74
1944-45	28.14	1951-52	40.42
1945-46	26.10	1952-53	48.99
1946-47	44.52		

Average for 39 years — 42.77

Abstract of Meteorological Observations made at the Southern Sugar Experiment Station, Bundaberg, from 1st July, 1952, to 30th June, 1953.

Month	Rainfall (Inches)	No. of Wet Days	Shade Temperature						Mean Diurnal Range	Mean Temperature 9 a.m.	Mean Per Cent. Relative Humidity 9 a.m.
			Maximum			Minimum					
			High	Low	Mean	High	Low	Mean			
1952											
July	·53	6	77	63	71·45	59	38	48·74	22·71	59·61	77·84
August ..	1·60	7	78	66	73·06	60	36	51·10	21·96	61·72	70·54
September ..	1·37	5	83	68	76·53	68	39	53·53	23·00	67·53	71·23
October ..	3·98	10	85	71	79·48	74	45	61·32	18·16	72·22	74·41
November ..	2·38	6	90	81	85·36	75	51	66·63	18·73	77·63	62·67
December ..	4·54	8	90	78	84·80	76	58	67·25	17·55	78·48	66·74
1953											
January ..	7·29	13	88	76	82·83	76	63	68·64	14·19	77·38	73·48
February ..	5·16	10	89	77	83·67	75	61	69·14	14·53	77·92	76·92
March	11·24	12	89	76	82·16	73	53	65·03	17·13	75·06	77·87
April	4·89	9	86	78	73·23	68	55	56·33	16·90	68·66	73·60
May	5·15	4	81	66	80·72	67	37	50·76	29·96	63·41	72·66
June	·86	4	80	66	72·35	61	33	45·07	27·28	58·00	74·64
Totals ..	48·99	94									

WORK OF THE STATION

Plant Introduction

Seventy-eight canes collected by the 1951 Bureau expedition to New Guinea and varieties from other overseas countries (C.P.43/47, C.P.44/155, H.39-5803, H.47-2910, P.R.902 and P.R. 905) were introduced from quarantine in the spring of 1952 and planted in Block C.1.

Seedling Selection

Seedling selection in the original "M" seedlings was carried out during August, 1952. A total of 131 seedlings was selected from the various crosses, and subsequently planted in 40-sett plots in Block D.1. During September, 61 selections were made and forwarded to the Beerwah isolation plot. In addition the new varieties B.37-161, C.P.29/120, C.P.30/24, C.P.36/111, CP.43/64, C.P.44/101, C.P.49/50, F.134, H.37-1933, Mentor, N.Co.291, N.Co.292, N.Co.293, N.Co.334, N.Co.339 and N.Co.349 which had been introduced from quarantine and propagated on the station last year were planted in 40-sett plots.

Sixty-three selections comprising 58 "L" seedlings, Co.475, F.108, P.O.J.2967 and P.O.J. 3016 were made from the plant 40-sett plots in Block E1. These, with K.128, which was selected from the ratoon 30-sett plots in Block A.3, were planted in a yield observation trial with Q.47.

Experiments Harvested During 1952 Season

The majority of the trials harvested during the year were concerned with seedling production, selection and testing.

The plant yield observation trial on Block B.1 included 27 "K" seedlings, P.O.J.2961, 40 SN 5819, 41 SN 3261, 41 SN 3339 and Q.47. Dry seasonal conditions experienced during the spring and summer months resulted in moderate yields only being obtained. Eight seedlings were better than the standard in tons of sugar per acre. Selections for further trials will be made from the first ratoon crop in August, 1953.

The first ratoon yield observation trial in Blocks D.2 and F. consisted of three "I" seedlings, forty-nine "J" seedlings with 33 SN 1882, 39 SN 3821, 41 MQ 779, M.171/30, M.134/32, M.112/34, M.165/38 and M.63/39 which were tested against Q.47 as the standard for comparison. Although yields were affected by adverse seasonal conditions, several selections were made and planted in a randomised trial on a district farm. These were hot-water treated for ratoon stunting disease and planted in propagation plots for future trial work. Parentages of selected seedlings are J.8 (P.O.J.2878 x G.257), J.28 (D.285 x C.P.29/116), J.32 (Q42 x P.O.J.2878), J.33, J.34 and J.42 (Trojan x C.P.29/116), J.38 (Co.290 x P.O.J. 2878), J.63, J.64, J.66, J.68, J.69 and J.70 (Trojan x P.O.J.2878).

The second ratoon crop of the fertilizer and plant residue trial on Block E.4 was harvested during the year, thus completing the fourth cycle of this trial which was first planted in March, 1938. The trial area is divided into six blocks, and on two of these the trash is burnt at harvesting; on another two the trash is burnt but a green manure crop is grown prior to planting, while on the remaining twoblocks the trash is turned into the soil and a green manure crop is grown. A fertilizer experiment involving the treatments (a) no fertilizer, (b) potash, (c) phosphoric acid plus potash is superimposed for the plant crop, while in the ratoon crops the following treatments are superimposed: (a) no fertilizer, (b) nitrogen plus potash, (c) phosphoric acid plus potash, and (d) nitrogen plus phosphoric acid plus potash, and (d) nitrogen plus phosphoric acid plus potash. No signifcant differences in yield of cane or sugar per acre were recorded from the trash-green manure teatments. For the fertilizer treatments NPK, NK and PK exceeded no fertilizer at the 1 per cent level, NPK exceeding PK at the 1 per cent level and NK exceeded PK at the 5 per cent level in yields of both cane and sugar per acre.

New Experiments Initiated During the Yea

A benzene hexachloride-fertilizer trial was established in Block B.6 with concentrated BHC (60-70 per cent gamma isomer) and crude BHC (13 per cent gamma isomer) for the purpose of ascertaining whether the more refined product is less phytotoxic than the crude BHC, or whether it inhibits the uptake of fertilizer less than the equivalent quantity of crude BHC when mixed with fertilizer.

2,4,5-T in a 1:140 concentration was tried against both old and young growth of *Heliotropium amplexicaule* and, although results are better than those obtained from other weedicides, regrowth has occurred from well-established crowns.

Field Days

Field days were held on the Bundaberg station on the 23rd July, 1952, and 21st May, 1953, when the attendance of growers and other persons associated with the industry was 400 and 550, respectively. It is pleasing to note that the attendance at these field days is increasing year by year, the attendance on the 21st May being a record. An excellent display of implements and tractors was provided by Bundaberg agencies.

LABORATORY WORK

The following is a summary of cane and water samples handled during the year:—

Station and trial cane samples	1,727
Farmers' cane samples	735
Irrigation waters	25

Summary of Crops Grown on Station

Varieties harvested, 1952 season—	Tons
Q.47	28.33
Q.49	177.30
C.P.29/116	40.33
P.O.J.2878	75.29
Seedlings	245.88
Total	567.13
Plant cane harvested	355.74
Ratoon cane harvested	211.39
Total	567.13
Total cane harvested for mill	554.10
Used for samples and plants	13.03
Total	567.13
Total acreage harvested	23.05
Average tonnage per acre	24.60

Division of Cane Breeding

(By J. H. BUZACOTT, Senior Plant Breeder)

Introduction

Over a period of several years there has been increased activity in the production of new varieties. A fourth Experiment Station has been established and two additional seedling testing sub-stations have been brought into service. The existing plant breeding staff was not adequate to cope with these increased activities and in 1950 a research scholar was appointed to undertake post-graduate studies in plant breeding work at a selected English university under a recognised authority on the subject. The immediate objective of this appointment was completed with the return of Dr. J. C. Skinner to Australia in March, 1953, and his subsequent appointment to Meringa as Geneticist. His addition to the staff has enabled a research programme to be commenced which has been a long-felt want. In addition, the transfer of Mr. N. G. Graff to the plant breeding division for work of a technical nature has enabled a programme of cytological investigations to be commenced. The increase in staff has been particularly appreciated during the cross-pollination period which, owing to its comparatively short duration, has in the past been a period of ceaseless rush with no time available for badly needed investigational work.

Cross Pollination

Following good spring and early summer growth during 1952 an early heavy wet season provided conditions which appeared favourable for profuse arrowing in 1953. An extended sunless period of some 35 days extending from 11th January to 15th February caused a marked check in growth; however, with the return of a sunny period later in February the cane again grew rapidly and extensive flagging in early May seemed to promise widespread arrowing. Towards the end of May a sequence of cold nights occurred, the minimum falling to 46°F. for three nights and culminating in a temperature of 41.5° F. This is the lowest May minimum recorded for the station, the average minimum for the month being 52.7°F. The cold snap delayed flowering considerably and few arrows were available for cross-pollination by the end of May. By mid-June it was obvious that flowering was going to be far from good and the season finished with some valuable parents, notably Q.27 and Korpi, entirely failing to flower. Co.290 arrowed very much later than usual and was not available for crossing until the end of June.

The first cross was established on 26th May and the last cross of the season was made on 22nd July. A total of 302 bi-parental crosses was effected whilst a polycross was conducted in order to test the breeding capabilities of a large number of new canes. Some 29 varieties were tested in the polycross in which the strong, select males Co.281, Comus, Eros, G.270, Q 31 and Q.36 were included.

Only three of the 1951 New Guinea nobles flowered and two of these appeared identical whilst the third was obviously a striped sport of the same variety. The available arrows were used in crosses, whilst one of the New Guinea *spontaneums* and six of the *robustums* were used in a number of crosses. The two other New Guinea *spontaneums* flowered early and unexpectedly and no arrows of noble or hybrid blood were available for crossing with them.

In view of the success of both Co.270 and Co.290 as parents in Queensland the recently introduced Co. varieties, Co.331 and Co.617, were used extensively in combinations. The latter has some reputation as a parent in India and as both are strong males they proved useful in a year of shy arrowing. Co.213, another recent re-introduction to Queensland, which is reputed to combine excellently with P.O.J.2878, produced two arrows and these were used to establish the cross. None of the Hawaiian varieties, introduced as parents in recent years, flowered and they were therefore not available for crossing.

It was desired to make the high sugar cross Q.27 x Badila and its reciprocal for trial in the Burdekin district but the failure of Q.27 to arrow prevented the fulfilment of this objective. Likewise Trojan x Q.27, a cross which has been most promising in the Burdekin, could not be made.

A full list of all bi-parental crosses made is given in Table VIIIA, whilst varieties represented in the polycross are shown in Table VIIIB.

Experimental

During the season an experimental technique based on that in current use in Hawaii was tested for keeping arrows in solution. The technique differs from the normal procedure carried out previously in four important essentials.

(a) A solution consisting of 150 parts per million of sulphur dioxide and 85 parts per million of phosphoric acid replaces that formerly used which contained 100 ppm. of each.

(b) All leaves except the flag are removed from each arrowed stalk.

(c) The preserving solution is completely replaced with 2 gallons of fresh solution twice weekly, and twice on intervening days the solution is topped up with one gallon per drum of fresh solution.

(d) The stalks are not "cut off" except once when first put into solution and a second time when taken to the ripening rack, one node being removed on each occasion.

Small scale tests were first carried out and when it was found that the arrows kept well and opened normally all the crosses made later in the season were conducted by this method.

Preliminary work was also carried out in keeping male sterile arrows under elevated night temperatures in an attempt to produce a greater degree of viable pollen. The methods were based on those in use in South Africa and were a prelude to more detailed work on this aspect of cross-pollination next year. Two crosses which normally set little seed in the field were also made in the glasshouse with an elevated night temperature in an attempt to improve seed setting.

Seedling Raising

Fuzz was sown at Bundaberg and Meringa during July, 1952, whilst fuzz for the Burdekin area was sown at Meringa during February, 1952, and at the Mackay station the sowing was made during March, 1952. Rather poor germinations occurred with the fuzz for the latter two stations. This fuzz had been stored in the refrigerator for eight months and its poor keeping qualities are the subject of a current investigation.

The 1951 "M" series seedlings at Meringa grew well and when selected in late July, 1952, they were vigorous but not lodged and were in consequence easy to select. Due to poor stooling and low brix many of the trial marriages gave no selectable seedlings. The total number of seedlings selected was 162, which included five for fodder purposes for the Department of Agriculture and Stock on the Atherton Tableland.

Crosses which gave the highest percentage of selections were G.331 x Eros, H.231 x G.331, Q.44 x G.362 and Trojan x G.331. From 992 plant seedling varieties at Babinda, 15 were selected, whilst from the ratoons of the previous year's seedlings, seven varieties were taken, this batch of seedlings having already been selected in 1951. In the plant crop G.362 x Badila was the only cross which produced a high percentage of selections whilst in the ratoon crop Trojan x E.K.28 was the most selectable cross. Outstanding crosses in the Burdekin "M" series were S.J.16 x Comus, H.Q.426 x Comus and G.362 x Comus. Most of the crosses represented were, however, unsuited to the district. Sixty-one (61) selections were made from the total of 6,240 seedlings. In Mackay, 73 seedlings representing 15 families were selected from 9,261 originals, P.O.J.2878 x Co.290, S.J.16 x Comus, Q.44 x Badila and Trojan x Eros producing the highest percentage of selections. From 5,904 "M" series seedlings at Bundaberg 131 selections were made. The most successful crosses here were N.Co.310 x Eros, N.Co.310 x P.O.J.2878, P.O.J.2875 x Eros, P.O.J.2878 x Co.290, Q.50 x P.O.J.2878, and Q.50 x Q.36.

The "L" series 40-sett plots at Meringa and Babinda will not be selected until the ratoon crop in 1953. At the Burdekin station 31 of the "L" series were selected from 75 represented and these were planted in a yield observation trial. Trojan x Q.33 and Trojan x Q.27 were the parents of the greater portion of the selections. At Mackay, selection of the 105 "L" seedlings will not be performed until the crop has ratooned, whilst at Bundaberg 58 seedlings were selected from the 122 "L" series 40-sett plots. C.P.36-105 x Eros, Co.270 x P.O.J.2878 and P.O.J.2878 x Co.281 produced the greatest number of selections, the excellent frost resistance of the first-mentioned cross being a factor in its strong representation in 40-sett plots.

The five "K" series seedlings planted in the "J" series plant yield-observation trial at Meringa did not perform well in the plant crop but on account of their high sugar content they were planted out for observation on better land. From the first ratoon 40-sett plots of "K" seedlings 37 were selected and planted in a yield-observation trial. The greatest number of selections were from the crosses Q.13 x G.269, Q.13 x Eros, Q.13 x Badila, Q.27 x Goru and G.263 x M.1900 Sdg. The good performance of Q.13 as a female parent is due largely to the high sugar content of its progeny. At Babinda the plant yield-observation trial, which included four "K" series seedlings, showed all to be superior to the standard Badila in tonnage per acre. They were all very open in habit and their cover appeared too poor for Babinda conditions; consequently it is not likely that they will be selected in the ratoon crop. In the first ratoon "K" series seedlings at Mackay Experiment Station only 20 were selected from a total of 167 and these were planted in a yield-observation trial. The poor performance of these "K" seedlings in ratoons was possibly due to the effects of ratoon stunting disease. Eighteen (18) seedlings were selected from the "K.P." series planted at Alexandra in the Mackay district. These varieties were also planted on the Experiment Station in a yield observation trial. P.O.J.2878 was used as a standard in this latter trial whereas Q.50 was the standard in the former. Five other "K.P." series seedlings were also planted out for observation. The Bundaberg "K" series yield-observation trial experienced poor growing conditions during the spring and summer months and although growth improved in autumn, yields were poor. Eight of the varieties outyielded the standard in tons per acre but six of them had an inferior sugar content. From ratoon "K" series 40-sett plots a further selection resulted in only one variety being selected. This

indicated that selection in the plant crop in the previous year included practically all the useful varieties. The one ratoon selection was planted in a yield-observation trial with the "L" series selections.

The plant yield-observation trial of "J" seedlings at Meringa was harvested but only two of the 21 varieties represented surpassed the standard in yield. The best appeared to be J.204, J.238, J.301 and J.330, but final selection will be made on the ratoon crop next year. Five "J" seedlings were also represented in the first ratoon yield-observation trial of "I" series seedlings. J.211 and J.225 were among the six best yielders in the block at harvest and they were planted with three "I" varieties in a randomised trial.

The "J" seedlings in a first ratoon yield-observation trial at Babinda gave a poor yield and none was deemed worthy of further selection whilst one variety, J.218, will be a possible selection next year from the plant yield-observation trial. At Mackay the yield-observation trial of "J" seedlings produced a first ratoon crop which was better than the plant crop. J.125, J.127, J.128 and J.132 gave satisfactory yields and were planted out in a randomised trial. The last-mentioned variety showed some red rot at harvest and may have to be discarded on that account. Of the three "J.P." varieties which were included in a plant yield-observation trial at Alexandra J.P.176 gave a yield comparable with that of the standard P.O.J.2878, whilst J.P.164 and J.P.178 both greatly outyielded the standard in tonnage of cane and sugar per acre. Indeed J.P.164 produced almost 10 tons per acre more and was a unit higher in C.C.S.

Two first ratoon yield-observation trials of "J" seedlings were harvested at Bundaberg. In one trial high yields were recorded from a number of varieties which greatly outyielded the standard Q.47. J.8, J.28, J.32, J.34, J.38, J.42, J.63, J.64, J.66, J.68, J.69 and J.70 were selected and planted in trials off the station. Six of these selections were of the parentage Trojan x P.O.J.2878, whilst J.8 is of interest as it has Turkmenistan *spontaneum* represented in its breeding. In the other trial several of the varieties outyielded Q.47 in the ratoon crop but were much inferior to it in the plant crop. From this trial only J.33 was selected for further plantings. Fifteen "J" varieties were transferred from Bundaberg to Nambour and eleven to the Maryborough and Childers isolation plot.

At Meringa selection of the first ratoon yield-observation trial resulted in the planting of the three "I" series seedlings, I.213, I.216 and I.252, in a randomised trial together with the two "J" series seedlings referred to above. In addition eight of the "I" varieties were planted out on a heavier soil type for further observation. I.426, a selection from the Bartle Frere sub-station, was propagated on the northern end of the Babinda area and its high early sugar may find it a place in the district. A tendency to lodge will preclude its use on the better soil types of the district. In a randomised trial of "I" seedlings at Mackay, I.126 and I.162 both outyielded Q.50, but not significantly, in sugar per acre, whilst in a plant yield-observation trial of "H", "I" and "I.P." seedlings, I.102, I.106, I.P.181, I.P.182 and I.P.184 all outyielded P.O.J.2878 in sugar per acre. In June the sugar content of I.106 was several units above that of P.O.J. 2878. It has been necessary to discard I.P.184 on account of red rot susceptibility. At Bundaberg the three "I" varieties, I.33, I.38 and I.68, which were included in the "J" series yield-observation trial, all out-yielded the standard Q.47 at harvest; however, their early sugar figures were not satisfactory.

H.253 and H.312 both gave high yields in the ratoon yield-observation trial at Meringa. The former is being propagated for use as a commercial variety on poor to medium soil types. The latter has been discarded on account of poor cover, sprawling habit and bad eyes. In the plant randomised trial H.231 and H.360 both yielded rather poorly, but on account of its high early sugar content H.360 is being tried on richer soils. H.231 has been discarded because of its very variable performance. At Mackay, in mixed yield-observation trial, H.130 gave a yield comparable to that of P.O.J.2878, whilst in a second ratoon yield-observation trial of 26 "H" series seedlings only the yields of H.105, H.106, H.126 and H.171 were comparable with that of Q.50. The randomised trial of "H" seedlings showed little difference between H.106 and Q.50, which both significantly outyielded the other six varieties in the block at the 1 per cent level. H.126 and H.130 also acquitted themselves well considering the dry conditions which prevailed from April onwards. At Bundaberg the "H" series selections are in propagation.

G.362 has shown some promise in Innisfail in the rich soil types where most varieties lodge. It is being propagated for further trial on these soil types and is the only Meringa "G" series still in propagation with the exception of Q.57, which was formerly G.273. Q.58, formerly G.105, is being propagated from disease-free stocks in the Mackay district and is yielding well there. Its early sugar has been at least as high as that of Q.50, whilst it is probably considerably less susceptible to red rot and hence might be a safer variety for late harvesting.

The extensive propagation planned for Q.57 in the far northern and Burdekin districts and for Q.56 and Q.58 in the central districts has had to be considerably modified due to the desire of the Bureau to plant out only disease-free stocks. All propagation plantings of these three varieties have to be hot-water treated before planting. Accordingly, their propagation is limited by the amount of planting material the various mill areas can treat.

NEW GUINEA VARIETIES

The varieties introduced from New Guinea in 1951 were distributed from the isolation plot at Redlands to the various Sugar Experiment Stations during September, 1952. Noble varieties were sent to all stations whilst the varieties of *S. spontaneum, S. robustum* and *Miscanthus floridulus* were sent only to Meringa. The varieties made good progress at all stations although it was noticeable that at Meringa several of the highland canes failed to make much growth until the winter months. This was particularly noticeable with the large clones of **S. robustum** collected in the Chimbu district. These were absolute dwarfs until the winter months when they made rapid growth. Likewise seedlings from seed produced at Redlands of the New Guinea highland robustum clones 51 NG.70, 51 NG.91 and 51 NG.91A showed extreme lack of vigour when grown at Meringa.

CYTOLOGICAL INVESTIGATIONS

Investigational work in the chromosomal constitution of a number of important breeding varieties was commenced. The parentage of certain of these, notably Q.13, Q.27 and Q.44, is unknown and it is desirable to ascertain whether they are hybrids or purely noble in character. Chromosome counts were carried out in some nineteen varieties. Most of the counts were made on pollen mother cells using aceto-carmine smears but some root-tip smears were also made. Various modifications of technique were used and the principal aim was to gain experience in relatively easy and rapid methods for future use. As was anticipated it was shown that Q.13 is a noble variety, whilst Q.27 and Q.44 are both apparently hybrids. Certain of the 1951 New Guinea spontaneum and robustum clones were also examined. It is intended to confirm the counts by paraffin sections of root tips at a later date.

VARIETAL STATISTICS

Although the far northern districts suffered a short rainy season in 1952 considerable winter growth occurred. This, coupled with a reasonably good season in the central and southern parts of the State, resulted in a crop nearly two million tons greater than that of the previous year and the largest crop of sugar cane yet harvested in Australia. Of this total the districts north of Townsville contributed almost half, a large portion of which was produced during the winter months and was not allowed for in early crushing estimates.

Trojan, for the third year in succession, occupied the position of premier variety in the State with a crop of 1,592,000 tons. However, it was closely challenged this year by Q.50 with 1,412,000 tons and it is reasonably certain at the time of writing that Q.50 will be premier variety in 1953. It also seems likely that Pindar, which ranked third in the State, and also for the first time surpassed 1,000,000 tons, will seriously challenge Trojan for second position in 1953.

In percentage of the total crop the figure for Trojan showed a slight increase over the whole State from 21.9 per cent to 23.3 per cent, but the percentage of it was less north of Townsville in 1952, although it was greatly increased in the Burdekin district where it was responsible for nearly sixty per cent of the crop. Q.50 showed a considerable increase in percentage in all areas except the Burdekin where it is scarcely represented. In Mackay-Proserpine it reached 77 per cent of the crop, an extraordinarily high figure for any modern variety. In Bundaberg district it increased from 3.3 to 10 per cent of the crop with a harvest of over 100,000 tons, whilst the tonnage harvested in North Queensland more than doubled the previous year's figures to reach 80,000 tons. Q.50 is the only variety which was represented by a crop of over a million tons in a single one of the four districts and conversely the Proserpine-Mackay district was the only one in the State which provided more than a million tons of one variety. In the 1950 crop Q.50 also exceeded the million ton mark in the Central district, but in that year Trojan exceeded one million tons north of Townsville.

Pindar registered the greatest improvement in position, rising from fifth position in 1951 to third place in 1952, the crop increasing from 429,000 tons to 1,035,000 tons. This made 1952 the second year in Queensland cane-growing history that three varieties have topped the million tons mark. Very extensive plantings of Pindar in the Burdekin district made it likely that it will challenge either Trojan or Q.50 for second place in the State in 1953. North of Townsville the tonnage produced rose from 582,000 to 875,000, whilst in the Burdekin district it rose from 37,800 tons to 106,500. Although it has also extended considerably in the central and southern districts its reaction to droughty conditions will probably militate against it ever becoming a major variety in those areas.

The steady but inexorable fall in place of Badila continues. Its percentage of 23 North of Townsville is a fall of 5 per cent, but in the Burdekin district it has dropped from 26 to less than 11 per cent, its total tonnage for the State now being well under one million tons. C.P.29-116 also slipped slightly in favour, dropping back to 10 per cent of the crop. Of the other varieties only Comus, Q.44 and Q.28 exceeded 2 per cent of the total.

P.O.J.2878 made a significant fall from eighth to twelfth position and only 82,000 tons of it was crushed. This drop is possibly largely due to the effects of ratoon stunting disease on this variety. Q.47 made a corresponding rise in popularity from 14th to 10th place and for the first time exceeded 100,000 tons, all of which came from the Bundaberg district. Varieties which appear on the list for the first time include Vidar, N.Co.310 and Q.56.

A marked increase in the percentage of the total crop represented by Queensland-bred varieties was a feature of the composition of the 1952 crop. A rise of 6.9 per cent brought the Queensland representatives to three-quarters of the total and there is little doubt that the percentage is going to continue its steady increase for some years at least. This fact is ensured by the steady increase of Q.50 in both North and South Queensland, the likewise steady increase of Pindar over a considerable portion of the State and the introduction of further Queensland-bred varieties such as Q.56, Q.57, Q.58 and Vidar.

Table VII and the graphic representation in Figure 5 show the composition of the 1952 crop on the basis of country of origin. Reference to these indicate that the increase in Queensland-bred varieties has been chiefly at the expense of Badila, the only New Guinea

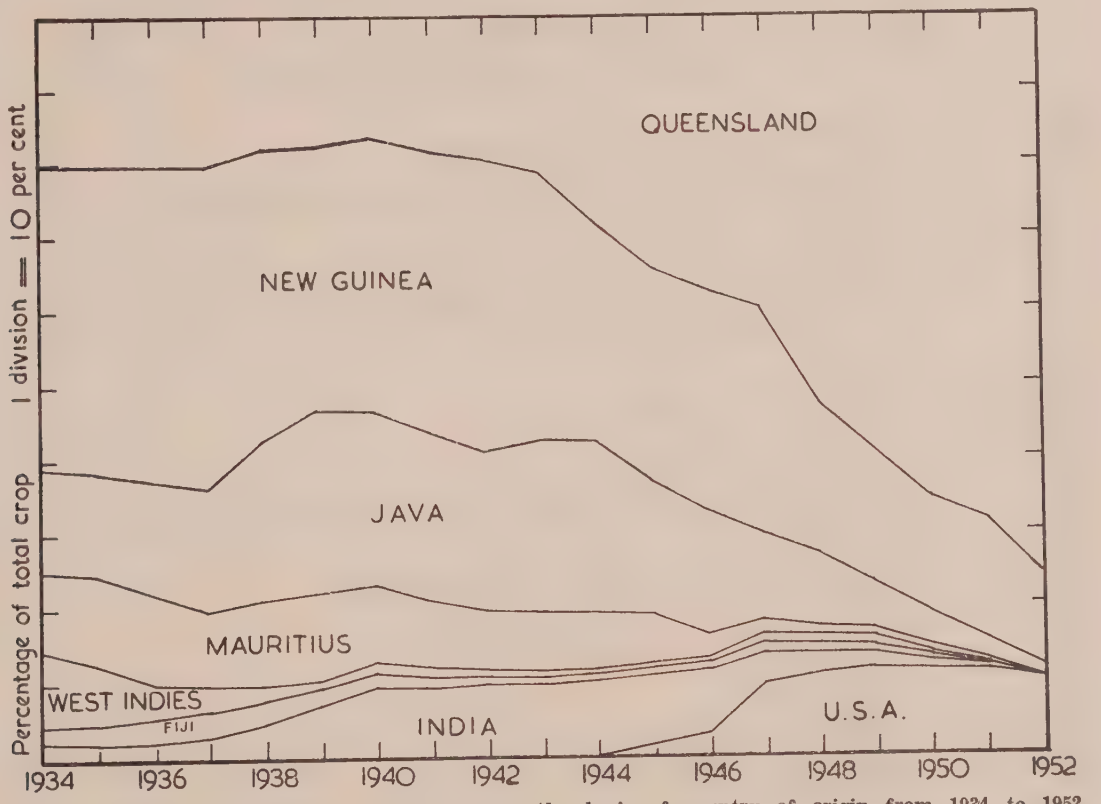

Fig. 5. Showing the composition of the crop on the basis of country of origin from 1934 to 1952.

cane now represented in commercial plantings in Queensland. The drop in Badila from 16.3 per cent to 12.6 per cent has been caused mainly by the extension of Trojan and Pindar in the Burdekin districts and of the latter in the Innisfail and Tully areas. United States

TABLE VII

COUNTRIES OF ORIGIN : 1952 CROP

Country of Origin	Tons of Cane	%
Queensland	5,155,128	75.4
New Guinea	863,822	12.6
U.S.A.	679,087	9.9
Java	107,033	1.6
India	17,659	.3
Mauritius	8,820	.1
Fiji	8,182	.1
S. Africa	935	-
West Indies	870	-
	6,841,536	100.0

varieties, represented only by C.P.29-116, have fallen by a little over 1 per cent, whilst Javanese varieties, chiefly represented by P.O.J.2878, are now only half the percentage of the crop they were in 1951. Co.290 and Co.301, together representing India, have now dropped to

0.3 per cent of the crop, whilst Mauritius, Fiji, S. Africa and West Indies varieties together provided only 0.2 per cent of the total. Of these latter only South Africa is liable to increase its representation in the immediate future due to the extension of plantings of N.Co.310, which is an early maturing variety and will find a place at least in South Queensland plantings.

With the continually increased plantings of Q.50 in far northern and southern districts, the extension of Pindar, particularly in the Burdekin district, and the propagation of Q.56, Q.57, Q.58 and Vidar in various parts of the State the percentage of Queensland-bred varieties can scarcely fail to maintain the rapid progress it has made, which has resulted in an increase from some 20 per cent in 1943 to over 75 per cent in 1952. Although C.P.29-116 may attain some popularity in future years in the Mackay district it is gradually being displaced in the southern districts and it is the only importation other than Badila which is liable to provide an appreciable percentage of the crop for some years to come. It is possible that the percentage of some varieties which are on the down-grade may improve with the introduction of measures to control ratoon stunting disease. It is not likely, however, that such measures will have an appreciable effect on the varietal constitution of the crop for several years.

TABLE VIIIA

List of Bi-parental Crosses made during 1953 Season

A.130	x Eros.
Atlas	x P.O.J.2878.
Badila	x G.362, H.Q.409, Mol. 4972, 51 N.G.63, 32-8560.
Co.213	x G.362, P.O.J.2878.
Co.270	x E.281, Eros, H.Q.409, G.270, 37 N.G.6, P.O.J.2878, Pompey, Q.36, Q.1098.
Co.281	x P.O.J.2878.
Co.290	x G.324, H.Q.409, P.O.J.2878, P.O.J.2961, Pompey, Trojan.
Co.301	x P.O.J.2878.
Co.331	x Co.617, C.P.29/116, E.281, Eros, 37 N.G.6, P.O.J. 2940, Pompey, 39 SN.3821, Trojan.
Co.419	x Badila, Co.281, Co.301, Co.331, Co.617, C.P.29/116. Eros, 37 NG.6, P.O.J.2878, P.O.J.2940, Pompey, Q.36, 39 SN. 3821.
Comus	x 37 NG.6.
C.P.34-120	x P.O.J.2878.
C.P.36-105	x Eros, P.O.J.2878, Trojan.
C.P.43-64	x E.281, Eros, 37 NG.6, P.O.J.2878, Q36.
C.P.44-101	x Pompey.
D.209	x H.Q.409, P.O.J.2878, Trojan.
E.281	x Co.331, 37 NG. 6, P.O.J.2878, Trojan.
Eros	x C.P.36-105, G.331, 37 NG.6, 51 NG. 91, 51 NG.144, P.O.J.2878, 39S.N.3821, Trojan.
F.108	x P.O.J.2878.
F.201	x Co.301, 39 S.N.3821.
G.217	x Co.290, Co.331, E.281, G.270, G.362, P.O.J.2878, Q.36.
G.250	x Q.13.
G.263	x Co.331, Comus, E.281, Eros, 37NG.6, P.O.J.2878.
G.324	x Co.290, Trojan.
G.326	x Co.331, Comus, G.253.
G.331	x Eros, Trojan.
G.362	x Badila.
H.265	x Co.331, Co.617, E.281, Eros, 37 NG.6, 51 NG.71, 51 NG.91, P.O.J.2878, Q.36,39 S.N.3821.
H.Q.409	x Badila, Co. 290, P.O.J.2878, Trojan.
I.201	x 39 S.N.3821.
I.203	x G.253.
I.211	x Badila.
I.213	x Eros, 51 NG.26, 51 NG. 91, 51 NG.91A, P.O.J.2878, Q.36, 39 S.N.3821.
I.216	x Comus, E.281, Trojan.
J.337	x Co.301.
Mol.4972	x Badila.
45 MQ.3205	x Eros, P.O.J.2878, Q.36.
N.Co.310	x C.P.29-116, Eros, P.O.J.2878, 39 S.N.3821.
N.Co.339	x Q.36.
37 N.G.6	x Co.331, Comus, E.281, Eros, P.O.J.2878, Trojan, Uba Marot.
51 N.G. 63	x Badila.
51 N.G.91	x Eros, P.O.J.2878.
51 N.G. 140	x Badila, P.O.J.2878.
51 N.G.144	x Co.290, Eros, Trojan.
51 N.G.146	x Co.290, P.O.J.2878.
51 N.G.163	x Trojan.
Pindar	x Q.36.
P.O.J.100	x Co.617.
P.O.J.2725	x C.P.36-105, Eros, 51NG.26, 51 NG.70, 51 NG.91, 51 NG.91A, Q.36, 39S.N.3821.
P.O.J.2747	x Q.36.
P.O.J.2878	x Atlas. Co.281, Co.290, Co.301, Co.617, C.P. 36-105, E.281, Eros, G.217, H.Q.409, 37 NG.6, 51 NG.91, 51NG140, Q.36, 39 S.N.3821, Trojan.
P.O.J.2961	x Co.290.
Pompey	x Co.290, Co.331, C.P.44-101, Q.36.
Q.13	x Badila, Eros, G.250, G.362, P.O.J.2878, Trojan.
Q.28	x Trojan.
Q.44	x Badila, Co.301, Comus, Eros, G.270, G.362, 37 NG.6, 51 NG.91, Q.36.
Q.50	x E.281, Eros, G.270, G.331, G.362, P.O.J.2878, Q.36, 39 S.N.3821.
S.J.4	x Comus, E.281, 37 NG.6, 51 NG.91, 51 NG.91A, 39 S.N.3821, Trojan.

TABLE VIIIA (Continued)

38 S.N.4305	..	x Co.331, Co.617, C.P.29-116, E.281, Eros, I.202, P.O.J.2878, Q.36, 39 S.N.3821.
39 S.N.3821	..	x Co.331, Co. 617, C.P.29-116, Eros, P.O.J.2878.
Trojan	..	x Co.290, Co.331, C.P.29-116, C.P.36-105, E.281, Eros, G.270, G.331, H.Q.409, I.216, 37 NG.6, P.O.J.2878, Q.13 Q.28, Q.36.
Uba Marot	..	x 37 NG.6.
U.S.49-7	..	x Badila.
31-2484 ..	..	x Co.331, Co.617, C.P.29-116, E.281, Eros, G.270, N.Co.310, 37 NG.6, P.O.J.2878, Q.36, 39 SN. 3821, Trojan.
31-2806 ..	..	x Eros, P.O.J.2878, Q.36, Trojan.
32-8560 ..	..	x Badila, Eros.

TABLE VIIIB

Female Parentage of Seed Saved from Polycross, 1953 Season

A.130	G.270	51 NG.163	Q.36
Co.281	H.265	Pindar	Q.42
Co.419	I.213	P.O.J.2725	Q.50
Comus	I.216	P.O.J.2878	S.J.4
C.P.43-64	45 MQ.3205	P.O.J.2940	38 SN.4305
D.209	N.Co.339	Pompey	Trojan
Eros	51NG.146	Q.31	Uba
31-2484			

TABLE IX—Varietal Composition and Distribution in the Four Main Districts and in the State as a Whole—1952 Crop.

Varieties	North of Townsville		Burdekin and Giru		Proserpine and Mackay		Bundaberg and South		Whole State	
	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%
1. Trojan	952,923	30.2	587,744	56.9	44,411	2.8	7,005	.7	1,592,083	23.3
2. Q.50	80,449	2.5	..	..	1,225,651	77.1	106,487	10.0	1,412,587	20.7
3. Pindar	875,849	27.7	106,561	10.3	32,763	2.1	19,742	1.9	1,034,915	15.1
4. Badila	746,936	23.7	110,463	10.7	6,423	.4	..	..	863,822	12.6
5. C.P.29/116	..	..	..	..	2,675	.2	676,412	63.6	679,087	9.9
6. Comus	101,573	3.2	78,290	7.6	34,648	2.2	..	..	214,511	3.1
7. Q.44	148,303	4.7	..	..	..	..	390	..	148,693	2.2
8. Q.28	..	..	..	..	123,889	7.8	14,411	1.4	138,300	2.0
9. S.J.16	..	..	118,094	11.4	..	..	..	..	118,094	1.7
10. Q.47	..	..	..	..	26	..	101,040	9.5	101,066	1.5
11. Eros	97,099	3.1	..	..	20	..	..	..	97,119	1.4
12. P.O.J.2878	1,893	.1	2,130	.2	49,547	3.1	28,375	2.7	81,945	1.2
13. H.Q.426	49,264	1.6	7,817	.8	4,711	.3	..	..	61,792	.9
14. Q.49	..	..	..	..	52	..	51,603	4.9	51,655	.8
15. Q.45	..	..	..	..	38,093	2.4	..	..	38,093	.6
16. Cato	35,088	1.1	..	..	..	..	..	..	35,088	.5
17. S.J.4	27,363	.9	636	.1	..	..	..	..	27,999	.4
18. E.K.28	92	..	13,366	1.3	8,618	.5	..	..	22,076	.3
19. Vesta	..	..	..	..	..	..	17,061	1.6	17,061	.2
20. Badila Sdg.	15,570.	..	..	..	..	..	..	..	15,570	.2
21. Co.290	..	..	..	..	5,962	.4	8,257	.8	14,219	.2
22. Vidar	9,592	.3	..	..	..	..	..	..	9,592	.1
23. Q.42	..	..	..	..	..	..	9,299	.9	9,299	.1
24. M.1900	..	..	..	..	7,654	.5	1,166	.1	8,820	.1
25. Pompey	8,182	.2	..	..	..	..	..	..	8,182	.1
26. S.J.2	..	..	5,092	.5	1,438	.1	..	..	6,530	.1
27. Q.55	..	..	..	..	..	..	6,257	.6	6,257	.1
28. Atlas	..	..	..	.	..	..	4,108	.4	4,108	.1
29. Q.51	..	..	..	..	..	..	3,729	.3	3,729	.1
30. Co.301	..	..	..	..	..	..	3,440	.3	3,440	.1
31. P.O.J.2725	..	..	1,309	.1	1,407	.1	..	..	2,716	
32. Ragnar	1,960	.1	..	..	..	..	..	..	1,960	
33. Q.25	..	..	..	..	..	..	1,424	.1	1,424	
34. Orion	1,137	..	..	..	..	..	..	..	1,137	
35. N.Co.310	..	..	..	..	..	..	935	.1	935	
36. Q.56	..	..	..	..	779	..	..	..	779	.3
37. B.208	..	..	768	.1	..	..	..	..	768	
38. A.130	..	..	..	..	..	..	505	..	505	
39. Q.813	..	..	..	..	40	..	360	..	400	
40. P.O.J.2714	..	..	..	..	296	..	..	..	296	
41. Others	3,056	.1	140	..	664	..	1,024	.1	4,884	
Totals	3,156,329	46.2	1,032,410	15.1	1,589,767	23.2	1,063,030	15.5	6,841,536	100.0

Division of Entomology and Pathology

(By R. W. MUNGOMERY, Officer in Charge)

GENERAL

The record crop of approximately eight and a half million tons of cane in sight for this season's production reflects among other factors the general improvement in the disease position and the absence of any serious damage from pests. Although the overall losses from ratoon stunting disease are still largely a matter of conjecture, it is well established that the full impact of this disease is softened by favourable growing conditions, and in so far that excellent conditions characterized the 1952-53 growing season it can be assumed that losses from ratoon stunting disease were lighter than usual. Grub damage was extremely limited, and it was particularly gratifying to witness the changed order of mills commencing crushing operations early in order to cope with record tonnages, rather than to save grub-smitten cane from further deterioration.

Ratoon stunting disease investigations continued to dominate the activities of the Division during the past year. Although the previous close association of this disease with Q.28 and the consequent rapid decline in popularity of this variety may have engendered in some quarters a feeling of lessened concern towards the disease, any tendency to decry its importance was quickly halted when a survey of Queensland's sugar-growing areas revealed the presence of ratoon stunting in all districts and in a wide range of cane varieties. This survey was made possible by the previous year's discovery that the appearance of certain orange-red discolourations in the nodal tissues was the most positive diagnostic characteristic associated with the disease. However, since these discoloured fibres are not always evident until the crop has made a considerable amount of cane it was realised that any additional means of identification giving earlier confirmation of the disease could speed up both investigational and control work. To that end, Mr. D. R. L. Steindl, one of the Bureau's pathologists, proceeded to the University of California, where arrangements had been made for him to study the latest techniques in the detection of viruses. It is hoped that as a result of Mr. Steindl's overseas studies and experience with some of the newer physical methods of virus detection, the Bureau's pathology branch will be better equipped to fight this insidious disease or any others that may subsequently confront this industry.

Prior to Mr. Steindl's scheduled return to Australia, negotiations were initiated by the British West Indies Sugar Association for him to visit a number of centres in those islands in connection with the suspected presence there of ratoon stunting disease. This proposal was readily agreed to since it was realised that such a visit could confer mutual benefits to the sugar industries of both Queensland and the West Indies. It is now expected that Mr. Steindl will return in September.

With the recognition of the widespread occurrence of ratoon stunting disease in Queensland came an increase in the tempo of control work, and all Cane Pest and Disease Control Boards were geared to undertake one of the most comprehensive clean-seed projects ever attempted. This project was one of the most keenly discussed subjects at the Conference of Cane Pest and Disease Control Boards which was held at Tully on 18th March, 1953. Of the 39 delegates and eight Bureau officers who attended several gave details of their equipment and experiences with the curative hot-water treatment of different sugar-cane varieties. In this respect a number of Boards were each able to have about one hundred acres planted this year with treated cane, and these fields should serve as important sources of clean planting material in the following year. Another interesting item which came before Conference concerned a somewhat novel method of poisoning redbills, and in the ensuing discussions the whole matter of bonus payments for scalps of bird and animal pests was placed in its correct perspective.

Chlorotic streak disease is fortunately not so widespread as ratoon stunting disease, but its incidence in some of the wetter areas has been of such an order as to occasion concern. Although it was felt for some time that the control efforts directed by some Boards against this disease have hitherto not been proportional to its seriousness, it is satisfying to realise that the clean-seed project initiated for the control of ratoon stunting disease will automatically set in train a campaign against chlorotic streak disease also. To what extent this will be offset by secondary infection is largely unpredictable, but investigations to determine the vector or vectors of these diseases, if any, and the rate of spread have now been commenced.

As forecast in the 1952 report of this Division Fiji disease showed a heartening reduction in its incidence in the Bundaberg and Moreton areas, and a point has now been reached in both centres where eradication is in sight. Although recently enforced control measures entail a shortening of the normal cropping cycle of the few remaining diseased fields (and to that extent may appear somewhat harsh), such a policy is inevitable if the last remnants of the disease are to be destroyed. However, this campaign is being implemented with due regard to the circumstances of each grower so as to entail a minimum of hardship consistent with the final objective of complete eradication.

The transfer of the disease resistance trials from the University farm at Moggill to the Bureau's own property at Eight Mile Plains was completed during the year, and it was possible to plant an area of approximately four acres embracing gumming, leaf scald, mosaic, Fiji, ratoon stunting, red rot and scale insect trials, as well as plantings of miscellaneous obscure diseases which are being grown for observational and investigational purposes. The general suitability of this irrigated property for this type of work was reflected in the successful infection of many varieties with leaf scald this year, whereas results from similar trials set out in other locations during the few preceding years were far from satisfactory.

Additional facilities for pathological investigational work were provided during the year by completing the insect proofing, hail proofing and ventilation of the prefabricated glasshouses erected on the Domain, and the two houses are now fully utilized. One of the more urgent problems for special study under glasshouse conditions involves the mode of transmission of a hitherto unknown disease which was detected last year in the variety Q.50 in the Bauple and Maryborough areas. This disease had assumed some importance because a number of plantings had been made from an infected source and there were some indications that secondary spread was occurring. The new disease causes a stunting of the plant, but probably not to the same degree as that caused by Fiji and dwarf diseases—in addition there is a tendency for the leaves to fan out somewhat stiffly. Its early stages are characterized by the appearance of pale yellow stripes in the unfolding leaf of the spindle and on that account it has been given the name of "spindle stripe disease". A very vigorous campaign is being pursued in an effort to eradicate it.

Consequent on the eradication of downy mildew disease from all the commercial canegrowing areas of Queensland it was evident that any continuation of the restrictions in the planting of maize in the Bundaberg district could no longer be justified; accordingly, following a recommendation from this Bureau, the relevant proclamation under "The Diseases in Plants Acts" by which these restrictions had previously been enforced, was rescinded by the Department of Agriculture and Stock. In the Babinda district, however, there was a tendency for the disease position to deteriorate further with the growing of a greater proportion of disease-susceptible varieties, and it became necessary to constitute a Cane Pest and Disease Control Board for that centre. This organisation is now actively functioning and it is confidently expected that a general improvement will soon be effected.

In the following, further details are given of the more important pests and diseases which are referred to under their respective headings:—

THE GREYBACK CANE BEETLE, *Dermolepida albohirtum* (Waterh.)

After the large reduction in greyback grub populations in the 1952 crops brought about by limitation of beetle emergence and desiccation of eggs by dry weather in the summer of 1951-52, a still further decrease took place in 1952-53. Weather conditions were not particularly dry at critical periods so it would have been expected that at least the previous population level should have been maintained. In seeking for causes for the further decrease the possibility must be kept in view that the widespread application of BHC was an important factor and that reserves of population in untreated grasslands did not give rise to any appreciable infestations in the cultivated canegrowing areas.

In the Mossman district greyback emergences were sparse and distributed over a period. No substantial flight was observed. In Hambledon and Mulgrave for the most part only odd beetles were seen, but a restricted flight took place near Aloomba in mid-November. Emergences were reported to have commenced in Innisfail in the second week of September, but it is unlikely that any effective egg-laying occurred there before the end of October. The resulting infestations, however, were low in numbers and diggings made in February in old cultivated sugar lands and in newly cleared areas disclosed grub populations ranging from nil to 0.4 per stool. Two sites with limited grass land adjacent averaged 0.5 and 0.8 per stool, while four trial sites selected as being likely to receive infestation from beetles that were present in adjacent pasture registered 0.7 to 2.25 grubs per stool. Greyback emergences were not extensive in the Tully district and an examination of two trial sites, both of which had a history of previous grub infestations, failed to reveal any grubs present.

Damage to cane by greyback grubs was virtually eliminated in most northern cane areas by the combination of reduced populations and the systematic use of BHC. The odd cases of damage recorded there were due to the faulty application of BHC, which was merely applied to the surface and not adequately incorporated in the upper few inches of soil. Failure on the part of individual growers to anticipate infestations and apply protective dressings of BHC had been responsible for substantial losses in the Ingham district in past years, but during the period under review damage occurred on only 100 acres there.

In contrast to many of the northern areas where the high probability of grub damage operates as a compelling factor in maintaining an adequate standard of control, grub damage in the central districts is usually more sporadic and growers adopt a more conservative attitude towards the necessity for expenditure on insecticides as an insurance against crop losses.

This attitude has doubtless been bolstered by the use of a number of resistant varieties in which light infestations are difficult to detect but which nevertheless must be suffering minor unassessable losses. However, last year's extensive infestations in parts of the Mackay district stimulated a greater interest in control measures, but it is considered that the use of BHC could still be profitably extended in that district even though grub losses at the present time are not spectacular.

Experimental work on grub control

As indicated previously, field experimentation was hampered by the absence of any appreciable greyback grub infestations in both the 1951-52 and 1952-53 seasons and only a small proportion of the trials set out warranted harvesting for grub control data.

BHC single application on plant crop versus ratoon re-treatment

These trials have been set out annually since 1950 on the red volcanic and mixed volcanic-schist soils in the South Johnstone area with the purpose of including erodable slopes in the trial conditions, since it had been suggested, though without any convincing supporting evidence, that erosion might operate against the persistence of BHC from the original applications. Although the main objective of these trials is the results in ratoon crops, the plant yields are worthy of some study. The heavier rate of application, 150 lb. (and in one case 200 lb.) of 10 per cent. BHC per acre, consistently gave higher yields than the lower rates of 100 lb. and 75 lb. of 10 per cent. BHC per acre. The difference was not statistically significant in any one trial, but an aggregate analysis of the trials showed the true average difference of 1.8 tons per acre in favour of the heavier treatment to be significant at the 5 per cent. level and almost so at the 1 per cent. level. (Necessary difference for significance, 1.34 tons at the 5 per cent. level, and 1.88 tons at the 1 per cent. level.) The grub infestations in each trial and the respective differences in tons per acre in favour of the heavier treatments are as follows:—

Trial site, South Johnstone area	Farm A	Farm B	Farm C	Farm D	Farm E
Grubs per stool	2.7	2.3	1.7	1.2	1.0
Yield difference in tons cane per acre in favour of the heavier BHC dressings ..	1.27	3.61	1.86	2.03	.5

From the foregoing it would appear that a single application of 150 lb. of 10 per cent. BHC (or preferably, from the cost angle, the equivalent 75 lb. of 20 per cent. BHC) is the best treatment rate, but the changing status of beetle and grub populations may require some modification of this viewpoint, and a continuation of trials of this type is therefore desirable for two reasons. Firstly, the tonnage differences are small where grub infestations are lightest, and the infestations currently experienced were much below those quoted. Hence significant differences in yields between the heavier and lighter dressings may not be obtained should grub infestations continue at a very low level. Secondly, if the heavier application gives an increased yield in the plant crop the recommended dressing of 75 lb. of 20 per cent. BHC per acre may not possess sufficient residual toxicity in the ratoon crops to guarantee adequate protection and maximum yields in the event of grub infestations being maintained at a substantial level. The latter possibility became evident in 1951, and since then trials of this nature have been designed to include treatments of 100 lb. of 20 per cent. BHC and equivalent re-treatments in varying forms.

One trial which was set out in 1950 had an average grub infestation of 2.1 per stool in the first ratoons and yielded a non-significant difference of 0.9 tons of cane per acre in favour of the single treatment. As a second ratoon crop this season it carried an average grub infestation of 0.8 per stool, but this would be insufficient on which to base a recommendation applicable to substantial populations. Some of the more recently established trials had such low grub populations this year that they are unlikely to yield information of any value when harvested.

Refined BHC of high gamma isomer content

During the year a number of samples of partially refined BHC (varying from 40 to 75 per cent. gamma isomer) were received for experimental purposes. On the basis of unit gamma BHC these compared very favourably in price with the crude BHC (13 per cent. gamma isomer); moreover they were in a very fine state of division and could be mixed directly with a diluent without any additional milling. A further advantage to be derived from the use of this partially refined material is the elimination of a large proportion of the unwanted isomers thereby reducing the risk of any phytotoxic effects; this would be of considerable importance in the event of the current long-range trials showing any ill-effects from the continuous use of the crude BHC.

Field trials were set out to compare the efficacy of this high-grade material against greyback grubs with that of the standard dusts prepared from the crude BHC. In an endeav-

our to expose some of the trials to satisfactorily high grub infestations, eight replicates were dispersed on sites where considerable grub damage had occurred in the previous season, and of these, four became lightly infested. They are to be harvested later this year.

Long-range BHC Toxicity Trial

In order to study to what extent the soil's cropping capacity might be influenced by the continued application of BHC over a number of years, field trials were set out on a farm at Babinda, and on the Bundaberg Sugar Experiment Station. The site selected at Babinda was one of the least likely to be affected by grub infestation, and the Bundaberg Sugar Experiment Station is not subject to any white grub attack which would tend to complicate the interpretation of results.

In one range of treatments the dust was prepared from the crude 13 per cent. gamma BHC, while in the second set of treatments equivalent amounts of gamma isomer per acre were applied with dusts prepared from a refined 88 per cent. gamma BHC. The dosages ranged from normal dressings to abnormally high applications which over-zealous growers have sometimes used. The blanket dressings which were applied prior to the last ploughing were included to simulate the residual effects from a previous cycle of treatments. Yields from the plant crop harvested on the Bundaberg Sugar Experiment Station were as follows:—

Treatments in lb. per acre of 1.3 per cent. gamma BHC		Yields of Cane in tons per acre with dusts prepared from		Means
as a blanket dressing before final ploughing	plus a row dressing after germination	Crude BHC (13% g.i.)	Technical gamma BHC (88% g.i.)	
75	150	38.76	39.11	38.94
125	100	36.24	37.97	37.10
300	150	39.85	39.51	39.68
Means		38.28	38.86	38.57

Mean for Control = 39.26.

The necessary differences for significance at the 5 per cent. level are—for individual treatments, 3.68 tons; for various amounts of BHC, 2.60 tons; and for different sources of gamma BHC, 2.13 tons. The differences therefore are not significant and it is evident that the different qualities of BHC used at the above rates have had no deleterious effect to date on crop production in that field.

BHC residual value after plough-out

Three trials were set out in the Mulgrave area in 1951 on lands which had received normal dressings of BHC on previous crops, for the purpose of determining whether, after the termination of the previous crop cycle, any measurable residual protection remained from the BHC which would justify a reduction in the amount of this insecticide used on subsequent plantings. Quantities applied in the trials ranged from 75 lb. to 150 lb. of 10 per cent. BHC per acre. No greyback grub infestation occurred in either the plant or the first ratoon crops, but two of the trials had a sufficiently high frenchi grub infestation in the second ratoon crop to warrant weighing the plots which are due to be harvested this season.

BHC usage by canegrowers for grub control

For the whole of the sugar-producing areas of Queensland it is estimated that during the past year BHC was applied as a protective dressing against grubs on 44,000 acres of plant cane, while a further 15,500 acres of ratoon cane also received treatment. Much of the latter consisted of re-treated areas, and most of the applications were made primarily against greyback grubs.

The Bureau's standard recommendation continues to be 75 lb. of 20 per cent. BHC per acre applied to the plant crop to give a three-year protection against greyback grubs, and protection up to the first ratoons against third-stage frenchi grubs. In districts subject to frenchi attack an application of 90 lb. of 20 per cent. BHC per acre is commonly used for protection against frenchi attack in the second ratoons. Although it has not yet been possible to follow frenchi control trials through to the second ratoons, this heavier rate of application seems justified by analogy with other effects.

A study of the quantities of BHC purchased in some mill areas indicates that some growers are involving themselves in a loss of net income by using excessive amounts of this insecticide for greyback grub control. This is particularly the case where re-treatments are being carried out and it is suggested that the majority of the growers concerned could profitably follow the Bureau's recommendation and make a single application only to the plant crop.

Fig. 5

The only downy mildew diseased cane in Queensland. This small plot on the Bureau pathology farm near Brisbane provides infected planting material for use in resistance trials of new cane varieties.

Fig. 6

A new record of plant parasitism on sugar cane : A plant of *Thesium australe* on a stool of cane from Booyal in the Childers district, South Queensland. The white swellings where the roots of the parasite are attached to those of the cane are clearly visible.

FRENCH'S CANE BEETLE, *Lepidiota frenchi* (Blkb.), AND ALLIED PESTS

Frenchi beetles were plentiful in the Cairns area at Highleigh, Meringa and Behana in November, 1952, and at that time sparse emergences also took place at Hambledon. An unusually early flight of beetles reported from Deeral raised the question whether these might have been *Lepidiota caudata* Blkb., but grubs collected since then in canefields in that area have all been frenchi.

The chief damage inflicted by frenchi grubs on cane crops occurred in the Mackay district where infestations were the most widespread and severe for a number of years. It was estimated that 700 acres were affected there. In the Tully district, light patchy damage was recorded on two farms comprising a total of 15 acres, and this appears to have been the first record of frenchi infestations in that area. Damage in other northern districts was on a much reduced scale compared with previous years, due chiefly to the use of BHC, but losses occurred on some farms because the BHC dressings applied for greyback grub control were insufficient to cope with frenchi attack. This was the case in the Mossman mill area where substantial damage in the Mowbray and Miallo sections resulted in a loss of approximately a thousand tons of cane. In the Hambledon area losses were less than one-fifth of those of the previous year, while at Mulgrave the light and rather limited damage that did occur was occasioned by the late planting of newly tilled grass lands or by the immediate replanting of ploughed-out areas.

In South Queensland, grub damage was the lightest for several years and only isolated outbreaks were reported. The only appreciable losses were from third-stage grubs of *Lepidiota trichosterna* Lea affecting 15 acres on four farms. These were at Alloway, North Gooburrum, Oakwood and Coonarr Creek in the Bundaberg district, and in some instances the growing of too many successive ratoon crops was responsible for the build-up of populations. Light infestations of *Pseudholophylla furfuracea* Burm. were reported from Gin Gin, Childers, and Burnett Heads, and the area fumigated amounted to 17 acres.

THE FUNNEL ANT, *Aphaenogaster* sp.

These troublesome ants which were recorded in past years chiefly around the Tully township were observed in the outlying Riverdale section on slight ridges in what was formerly pasture land, but which has now been assigned to canegrowing. Localized damage to cane on sandy soils in the Tully area was considerable, and their activities were also noticed on new lands at the adjoining south-east extremity of the South Johnstone mill area.

A field trial was set out to determine whether control could be effected by placing insecticidal dusts at different depths in the drill. Neither BHC used at the rate of 75 lb. of 20 per cent. dust per acre (1.95 lb. gamma BHC), nor Dieldrin at the rate of 200 lb. of 1 per cent. dust per acre (2 lb. technical Dieldrin), exerted any observable control whether applied below the cane or just above the cane at planting time, or later in the half-open drill.

TERMITES

Following last year's damage by the giant termite, *Mastotermes darwiniensis* Frogg., to young plant cane on the Lower Burdekin, a trial was set out using BHC and Dieldrin placed in the drill at planting time as a protectant. Dieldrin and gamma BHC were each applied at the rate of .325 lb. per acre, the former as a 1 per cent. dust and the latter as a 1.3 per cent. gamma BHC dust prepared from a refined 88 per cent. gamma BHC, with the object of minimizing damage to cane roots when placing the insecticide close to the setts. Neither chemical exerted any observable control.

ARMY WORMS

For the most part army-worm damage was not widespread during 1952-53, but local outbreaks of one or other of three species occurred in varying degrees of intensity. At Babinda outbreaks of *Cirphis unipuncta* Haw. occurred in September and October, the later attack resulting in the complete defoliation of a plant crop of Pindar about six feet in height. Dense weed growth followed the loss of cover and parasites were subsequently very active but the field ultimately developed an excellent crop of cane. The day-feeding army worm, *Laphygma exempta* Wlk., occurred in dense outbreaks at scattered localities throughout the north in March, 1953. These originated mainly from grass in fallow lands and their progress into canefields was largely prevented by barriers of BHC dusted on the soil or by arsenical baits laid in their path.

Army-worm infestations were more extensive in the Ingham district where on different occasions an aggregate of several hundred acres of cane was defoliated to varying extent. The semi-looper, *Mocis frugalis* Fabr., was responsible for the greatest damage, and its activities also extended to the Mackay district where minor damage was reported.

LOCUSTS

Any trouble from locust attack in Queensland canefields is usually attributable to the yellow-winged locust, *Gastrimargus musicus* Fabr., but this species was notably absent this year and its place was taken by *Locusta migratoria migratoriorides* Reh. & Fairm., which invaded some of the northern and central cane-growing areas. In the Cairns district swarms settled in the Greenhill area in December, 1952, and hoppers emerged from egg beds in January and February, 1953, in sufficient numbers to cause considerable damage to about one hundred acres of cane. Towards the end of March a migrating swarm was observed moving south towards the Highleigh area, but it did not settle there. Other minor swarms were seen at Meringa and near Yorkey's Knob. In the central districts the same species appeared in small localized areas between Carmila and Proserpine, and by the end of February young hoppers were attacking the cane in large bands. Excellent control was achieved by applying a BHC dust either to the swarms of winged adults, or to the bands of young hoppers which were comparatively easy to surround. In other instances a BHC dispersible spray was used quite successfully.

SOIL MICRO-FAUNA INVESTIGATIONS

Work this year in connection with the microscopic soil Arthropods was concentrated mainly on improving the technique for their separation from the soil. In addition individual species were mounted on slides for reference purposes and later on it is proposed to study the habits of those that are found to be phytophagous. To date 23 species of Acarina, six species of Collembola, and three species of Myriopoda have been recognised.

The extraction of the specimens from the soil samples was done both by the flotation method and by the Berlese funnel, because it was found that each method disclosed some species more readily than the other, e.g., Collembola did not appear as readily by the light method as by flotation, and the reverse applied to some of the smaller and more transparent Acarina. However, parallel tests indicated that the flotation method was generally the more reliable for the majority of the small animals encountered.

MISCELLANEOUS INSECT PESTS

The only report of damage by wireworms, *Lacon variabilis* Cand., came from areas where new lands had been planted without applying the customary protective BHC fertilizer dressing at planting time. This is the standard method of obviating attack in all low-lying areas of the central districts where hitherto the wireworm pest had been a major problem.

Borers continued to be of minor importance and probably the chief offender was the bud caterpillar, *Opogona glycyphaga* Meyr., which burrows into and destroys the buds on the cane stalk. On a Babinda farm 50 per cent. of the eyes of an experimental variety, 41 M.Q. 779, were destroyed in this way and Comus was reported to have been badly affected in the Aloomba area. Babinda also had light infestations of the moth borer, *Phragmatiphila truncata* (Walk.), but these were mostly confined to the immediate vicinity of headlands. With the general pre-harvest burning of crops the weevil borer, *Rhabdoscelus obscurus* (Boisd.), remained at a very low level and only odd specimens were seen in the Johnstone and Cairns districts.

Due to the reduction in acreage of standover cane in the southern areas the scale insect, *Aulacaspis madiunensis* Zehnt., was not much in evidence, though a heavy infestation was present on some standover Q.49 at Bingera. In addition to its known occurrence in the Bundaberg and Mackay districts this insect was also noted for the first time in the Isis district where it was present on some old neglected P.O.J.2878.

A small Scarabaeid beetle, *Ataenius duplopunctatus* Lea, was found to be associated in a peculiar way with damage to cane on a few farms in the Isis, Bundaberg and Mackay districts. It seems likely that the insect was attracted to canefields in the first instance by decomposing filter mud, substantial deposits of which had been applied to a number of fields with the object of increasing fertility. Dry spring conditions which supervened after the fields had been planted resulted in a number of the larvae attacking the roots, thereby causing plant failures. As far as can be ascertained the outbreak at Mackay was not associated with any deposits of filter mud or other organic matter.

During the year an attempt was made to bring the pink sugar cane mealy-bug, *Saccharicoccus sacchari* (Ckll.) under more effective biological control by importing the Encyrtid parasite, *Anagyrus saccharicola* Timb., from Hawaii. The first Australian generation was successfully bred in the laboratory and was later liberated on some mealy-bug infested Co.301, which was due to be left standover on the Redlands Horticultural Experiment Station. Unfortunately the mealy bug populations were subsequently seriously depleted by a plague of mice, and to date no recovery of the parasite has been made.

Specimens of "earth pearls" which were found attached to cane roots in the Bundaberg district and which were forwarded to the British Museum some years ago have now been identified as *Eumargarodes laingi* Jakubsky, and *Hemimargarodes sacchari* Jakubsky.

ANIMAL AND BIRD PESTS

Damage by the field rat, *Rattus conatus* Thomas, was not particularly serious in any of the mill areas, and systematic baiting was maintained whenever any signs of damage were seen. In the Hambledon and Mulgrave areas, however, the tree rat, *Melomys littoralis* Lonn., was reported to be rather more prevalent than in recent years. Wallabies, similarly, were not responsible for any extensive damage since there was no prolonged droughty period and grass generally was in good supply.

Mossman and Tully were the only mill areas in which pigs caused appreciable trouble, the latter recording a loss of 100 tons of cane.

In all of the South Queensland cane-growing areas foxes showed a marked preference for Q.50, and with the more recent extensive plantings of this variety losses took a steep upward rise. In one instance a nine-acre block was protected by the simple expedient of installing a three-strand electric fence, the claim being made that the cost of installation would be more than offset by the losses that otherwise would have been incurred. However, it is felt that some serious attempt should be made to reduce the numbers of this pest and to this end the Cane Pest and Disease Control Boards concerned should give due consideration to the advisability of paying a bonus for scalps as is done in the case of wallabies and pigs in the central and northern districts.

The bald coot or redbill, *Porphyrio melanotus*, did minor damage to cane in most areas. In the Goondi area it was more prevalent than usual, and in Inkerman a loss of £300 was estimated through patchy damage on a few farms. The shining starling, *Aplonis metallica* Temm., was reported to have caused some unusual damage to Badila in the South Johnstone district by countless numbers of these birds congregating in limited areas and roosting on the foliage at night, thereby breaking and tangling the leaves and bending over the spindle.

Disease Investigations

(C. G. HUGHES, Senior Pathologist)

RATOON STUNTING DISEASE

Surveys carried out during the spring of 1952 in the mill areas north of Proserpine showed that ratoon stunting disease was widely prevalent, which means that the disease is now known to occur in all mill areas in Queensland. Symptoms of the disease used in its positive identification in the North included both the discolouration of the vascular bundles in the node and severe stunting, some examples of which were quite as spectacular as any seen in other parts of Queensland. It was noted that Trojan, the most important cane in North Queensland, suffered severely on many farms and the estimation of losses was made even more positive in some instances by the accidental use of plants from diseased and comparatively healthy sources in the one block. The other two leading northern canes, Pindar and Badila, showed the disease but the losses may not be as severe in these canes. However, the true picture of varietal reaction to the disease in the North has not yet emerged.

Specimens brought from the Tweed River area of New South Wales showed the disease to be present there and the year under review has also given new light on its distribution in overseas countries. Imported cane from the United States of America and South Africa in the Bureau quarantine house in 1951-1952 showed the discoloured nodal bundles after a year's growth and subsequent inoculation tests proved that the canes carried the disease. This was not taken as positive proof of the disease in those countries and it was of interest to have this diagnosis later confirmed by personal examination by travelling Bureau officers. The disease has now been identified by officers of this Bureau in the following cane-growing countries: Hawaii, mainland of United States of America (Louisiana and Florida), Colombia, Puerto Rico, British West Indies and South Africa. In addition, reports by American pathologists indicate that it is also present in Mexico.

The fact that ratoon stunting disease can be cured in setts by treatment in hot water has formed the basis for the establishment of clean-seed schemes in the various districts. In a few areas, plantings were made during the 1952 season but they were on a small scale only. The first plantings were treated at 53°-54° C. for one hour but it was quickly found that few varieties withstood this treatment as well as Q.28. Many canes failed to germinate and experiments varying the time and temperature (but still within the range giving control of the disease in Q.28) led to the adoption of 50° C. for two hours for the large-scale plantings of the 1953 season. Even with this treatment, which gave quite satisfactory germinations with Q.28, some varieties gave poor germinations if environmental conditions were not perfect or the plants too succulent. In attempts to improve the germination, the setts were specially selected from mature cane and the basal and top portions of the stalks dis-

carded, the minimum cover of soil was put on top of the setts, and planting was discontinued during the cooler weather when soil temperatures tended to be low. Some districts are further ahead than others with the heat treatment of planting material but even so the building up of healthy stocks is proceeding to such an extent that every farmer in most mill areas will be able to have clean plants of all approved varieties in his particular district within two or three seasons.

The heat treatment of approved varieties is the responsibility of the various Cane Pest and Disease Control Boards working under the general supervision of the Bureau, which also arranges on behalf of the Boards for the purchase of the necessary thermometers and steam-control valves, but the Bureau is also very active in its own hot-water treatment programme and by the 1954 planting, all seedlings from and on the Experiment Stations should be free from the disease. The treatment of canes used in the cross-breeding work has also been undertaken since the presence of a disease such as ratoon stunting could easily invalidate certain aspects of the cane-breeding programme.

The four acres of cane in the Dundula plot in the Mackay district includes plant and ratoon resistance trials for ratoon stunting as well as a range of experimental plantings on the same disease. Examinations in the mature crops showed that treatment in water at 53-54° C. for one hour controlled the disease in a wide range of varieties and abundantly confirmed the previous discovery that the disease was easily transmitted to many varieties by inoculation of the sett with diseased juice or by cutting with an infected knife. Juice from diseased stalks of Q.28 was found to remain infective for two days after evaporation, or when diluted with water up to 10,000 times. When treated for ten minutes with formalin at ten per cent., "Dettol" or phenol at one per cent., "Phenyl" and "Lysol" at 2.5 per cent., the juice was rendered non-infective, but its infectivity was not affected by acriflavine at .2 per cent.—nor "Aretan" at one per cent. Inoculations revealed that juice from the leaves of diseased cane was infective but extracts from grass and soil gave negative results. Heating the juice for ten minutes at 55° C. rendered it non-infective.

The presence of discoloured nodal vascular bundles has been found generally useful in identifying ratoon stunting disease but some training is necessary in the recognition of this symptom. A number of factors may cause the discolouration in the lower part of the node when the straight vascular bundles of the internode first start their convoluted course upwards through the node, but in other diseases such as leaf scald and chlorotic streak, other symptoms can usually be found: discolouration due to infection of leaf traces is common but its darker colour and the fact that it occurs in vascular bundles close to the rind should prevent confusion with ratoon stunting. A problem is presented by such varieties as S.J.16 and G.176 which show dark golden-yellow bundles in normal healthy cane; these do, however, show symptoms very obviously in diseased stalks and if both healthy and diseased are available for sectioning, there is no confusion. Although some comparatively resistant varieties, such as Badila, C.P.29/116 and Q.50, may not show discoloured bundles when inoculated with diseased juice, it is known that these varieties do take the disease. The relationship between resistance and development of this symptom is not yet clear. The same variety may vary in its display of discoloured bundles from district to district as, for instance, Q.28 which at Brisbane has shown the symptom in early summer even when only four months old, while at Mackay the discolouration usually does not show until the cane is mature in winter.

As well as resistance trials based on comparisons between inoculated and non-inoculated healthy material, yield trials and/or yield-observation strips have been planted in all districts in an effort to gauge the losses occurring in the various standard commercial canes. When possible these comprise diseased v. healthy material but in many instances the only clean planting material available is that which has been treated in hot water for the particular planting. This will largely invalidate plant trial results but should not affect ratoon crops, where the greatest differences are expected.

PINEAPPLE DISEASE

The rotting of setts (and subsequent poor germination) due to the fungus *Ceratostomella paradoxa* (de Seynes) Dade, occurred in all districts when susceptible varieties were planted without treatment in the cooler weather. The disease was more prevalent than usual and even in districts such as Innisfail where good germinations are the usual rule, an increasing number of farmers are finding that the pre-planting treatment of setts is a paying proposition. Previously setts were usually treated by immersion in a tank of mercurial solution but now many farmers have fitted sprays to the chute of the cutter-planter and the sett is sprayed with mercurial solution as it is cut and slides down the chute. An excellent outfit combining a circular saw for cutting the setts, a mercury bath, a conveyor belt and a bagging station has been mounted in duplicate on a tractor by the Fairymead plantation in South Queensland. The output from this machine is over two bags of plants per minute and while it is too large and too expensive for the individual cane farmer, it may be of service to a district on a contract basis.

The compound methoxy ethyl mercury chloride is the active principle in the formulations used in the mercurial solutions for the treatment of setts and the concentration of mercury in the solution is .015 per cent. in the cold dips and .003 per cent. in the hot water used for the control of ratoon stunting disease. Chemical methods for estimating mercury in such low concentrations have not proved satisfactory and it has been found necessary to carry out biological assays in following the deterioration of solutions. Such assays have shown that the .003 per cent hot solutions deteriorate within a week even when topped up as used; the stronger solution is somewhat more stable.

Results from a germination trial which included a number of compounds are not to hand at time of writing but two previous trials indicated that "Tetroc" and hexachlorbenzene are useless as sett protectants against pineapple disease.

CHLOROTIC STREAK

Chlorotic disease continues to be a problem in the wetter parts of North Queensland and in the southern areas of Moreton, Maryborough and Rocky Point. However, field experimental work and yield trials with this disease have been largely rendered invalid by the variable effect of ratoon stunting disease in plants from various sources and this latter disease will have to be brought under control before any further work on chlorotic streak can be initiated. It should be pointed out also that chlorotic streak is not without its influence on the ratoon stunting work because although the hot-water treatment for r.s.d. controls streak, chlorotic streak spreads into a healthy stand more rapidly than r.s.d. and may jeopardise clean seed schemes aimed against that disease.

Tests in connection with the possible insect transmission of chlorotic streak disease were initiated during the year, but since ratoon stunting disease was found to be widespread in the same areas in which chlorotic streak disease occurred, it was decided to combine the preliminary investigations to cover the possibility of both, or one or the other of the diseases being insect transmitted. In scouting for possible vectors collections were made of the more common sap-sucking insects usually associated with cane. These collections were made in badly diseased areas and were used in stocking cages which had been planted with diseased and healthy material. The healthy material in this case had previously been subjected to a hot-water treatment at 50° C. for two hours. The cages were of such dimensions as to allow the insects to breed freely and to transfer naturally between the diseased and healthy plants. In addition there was the possibility of introducing an already infective specimen amongst the insects which were collected periodically for stocking the cages.

The insects at present being tested include the following : *Perkinsiella saccharicida* Kirk., *Lophops saccharicida* Kirk., *Cicadella parthaon* Kirk., *Proutista lumholtzi* Kirk., *Phaenacantha australica* Kirk., *Saccharicoccus sacchari* (Ckll.), and *Aphis sacchari* (Zehnt.). To date there has been no evidence of any transmission having taken place.

LEAF-SCALD DISEASE, *Bacterium albilineans* (Ashby)

Leaf-scald continues to be a problem in varieties such as Q.44 and Trojan and, to a lesser extent, S.J.4 and Badila in the wetter localities in North Queensland. In the Tully mill area a start was made in a clean-seed scheme for the variety Q.44 by bringing six tons of plants from the Burdekin district, where leaf scald is not known to occur. In addition, surveys by the local Cane Pest and Disease Control Board indicated the safest sources of comparatively clean plants within the Tully district. Similar control measures were also continued in some of the more northern areas, and could profitably be extended to others.

At Moreton in South Queensland, where leaf-scald was reported last year for the first time after a lapse of many years, the disease was found to be confined to Trojan amongst the commercial canes. This variety was becoming unpopular on other grounds and with its removal from the approved list of 1953 it will rapidly pass out of cultivation.

A leaf-scald disease resistance trial was conducted for the first time at the Pathology Farm at Eight Mile Plains some 11 miles from Brisbane. It included advanced seedling canes, commercial canes grown in the Moreton area and a range of standard varieties. The ends of the setts were pressure inoculated with a mixture of diseased juice from various sources. A reasonably satisfactory amount of disease developed although the behaviour of Trojan was anomalous in that, although commercially a somewhat susceptible cane, it did not show any diseased stools. H.Q.426 showed approximately 20 per cent disease and Q.57 28 per cent, with some obviously dangerously susceptible seedlings showing up to 44 per cent infected stools. The varieties Co.301, N.Co.310, P.O.J. 2878, Q.28, Q.42, Q.47, Q.50 and Vesta did not develop any disease. The trial is to be ratooned.

MISCELLANEOUS

Hitherto the only flowering plant parasites recorded on sugar cane in Queensland have belonged to the genus *Striga* but recently a new record was made in the Booyal district in South Queensland. The parasitic weed was identified by Mr. W. D. Francis, the Queensland Government Botanist, as *Theseum australe* R. Br. The reference given ("The Queensland Flora" by F. Manson Bailey, Q. Govt., 1902, pp. 1383-1384) states that the weed is a native plant common in many localities in the Moreton Bay, and Dawson and Burnett River districts, but no mention is made of its parasitism. *T. australe* is the only Australian species described although authorities have difficulty in separating it from species recorded elsewhere. It is perennial and, in marked contrast to *Striga* grows quite actively during the cooler months.

The poor ratooning and death of stools associated with a species of the fungus *Verticillium* at Bundaberg and Mackay has been under investigation. Losses have been considerable on individual farms in the South Kalkie area at Bundaberg and occur on irrigated and dry blocks and on farms of varying yielding capacity. A survey has shown that the infected farms have one thing in common, viz., a lack of legume cover crops dating back many years, and trial legume plantings and soil amelioration treatments are being undertaken.

A stem rot in the variety Pindar at Babinda gave rise to some concern among a few farmers when infected blocks gave an unduly low C.C.S. at harvest. Investigation revealed that the rot was associated with large growth cracks (which are very common in Pindar) but no pathogen could be isolated from them. The rot was internal and affected stalks were outwardly normal. Incidence of the rot varied from field to field, and even within infected fields only a small section showed the rot. The rapid harvesting of all blocks of Pindar still standing in October prevented observations on the course of the disease. The indications were that the rot was simply an expression of over-maturity since Pindar is normally an early-maturing cane.

In an endeavour to identify the strain or strains of mosaic disease in Queensland a collection of diseased material from various parts of the State was established at Eight Mile Plains Pathology Farm. Subsequently inoculations were made into the test varieties Co.281, C.P.29/291 and C.P.31-294. Results obtained did not enable a classification according to the key of strains published by United States of America workers but the indications are that only one strain, and that a non-killing type, is present here. An interesting item concerning mosaic disease, confirmed during the year, was the eradication of the disease from the Inkerman area on the Burdekin River delta. It marks the culmination of an active programme of roguing and seed control by the local Cane Pest and Disease Control Board and gives Inkerman the distinction of being the most disease-free area in Queensland.

Fiji disease is now at a low ebb and, with the ultimate goal of eradication clearly in sight, control measures are being continued with all vigour. In the Rocky Point area 13 diseased stools were rogued by the Cane Pest and Disease Control Board, at Moreton 35 stools and in the Bundaberg area 14. The total of these is approximately one-sixth of those found in the same districts last year. Control measures involving the few remaining diseased fields either by early harvest or by a ploughout before the end of the normal cropping cycle, are being intensified, and from experience in districts such as Maryborough and Isis, where the disease has been eradicated with recent years, it is confidently anticipated that Fiji disease will soon disappear from commercial cane fields in Queensland.

A disease now provisionally named "spindle stripe disease" was recorded as being present in the Mt. Bauple district of South Queensland in this Report for last year. It has now been seen also in the Maryborough area, but only in plantings which could be traced back to the original outbreak. The only variety affected is Q.50 and to date 436 diseased stools have been rogued. Chief symptoms in the leaves consist of regular but not obvious streaks ranging in width from narrow striations to 3 mm. They are only distinguishable by their slightly paler colour than normal and even where most obvious towards the base of the two, youngest, unfolded leaves they are not easily seen. There is no necrosis and the older leaves do not show any symptoms. Diseased stalks show some stunting especially in the ratoons and often show an abnormal oval rather than circular cross section. Growth cracks are more numerous and severe than in normal cane and fine vertical striations extending from growth ring to wax band occur on all internodes except at the base of the stalk. The striations are also apparent on the leaf sheaths. There is some change in texture of the leaves and a waviness of the edges but the diseased tops are not always easy to see. Attempted isolations have not yielded any suspected pathogen and sections of the leaves do not show any invading organism. The disease is systemic and infected stools yield setts which give rise to diseased plants.

The free legume culture service to cane farmers was continued and sufficient inoculum supplied for the treatment of 390 bushels of various types of cowpea, 69 of velvet bean, 49 of mung bean and 6 of field pea.

QUARANTINE

A total of eighteen varieties came to maturity under observation in the Brisbane quarantine house. The majority were importations from overseas although two "Q" canes were on transfer from one Queensland quarantine district to others and to New South Wales. Imported varieties were distributed, after treatment in air at 54° C. for eight hours against ratoon stunting disease, to the four Bureau Experiment Stations, the Beerwah isolation plot and the Redland Bay variety garden near Brisbane. The "Q" canes were also treated before despatch. The imported canes included Co.213 and Co.385 from South Africa, Pepe Cuca from Cuba, P.R.902, P.R.905 and M.336 from Puerto Rico, C.P.36-138, C.P.43-47 and C.P. 44-155 from the United States Department of Agriculture and H.34-3171, H.35-198, H.36-7913, H.39-5803, H.40-1184, H.44-2364 and H.47-2910 from Hawaii. Canes remaining in the house after transfer requirements had been met were examined for ratoon stunting disease. The varieties Co.385 from South Africa and C.P.36-138 from America showed the typical discoloured vascular bundles, while Co.213 showed suspect symptoms. Subsequent inoculation into healthy Q.28 confirmed the presence of the disease in both Co.385 and C.P.36-138, which has been referred to in a previous section of this report.

The canes brought from New Guinea in 1951 and planted at Redlands Horticultural Experimental Station near Brisbane were distributed to the various Sugar Experiment Stations in the spring of 1952. The plant crops on the Stations and the ratoons at Redlands were both sprayed repeatedly to minimize insect colonization and were kept under close observation. The Station plantings remained healthy although two varieties which showed Fiji disease in the ratoons were rogued as a precautionary measure. Certain of the wild canes flowered in the plant crop and ripe seed was sent to Meringa for sowing.

Division of Mill Technology

By J. H. NICKLIN, Chief Technologist (Engineer)
and J. L. CLAYTON (Chief Mill Technologist).

CHEMICAL TECHNOLOGY

Laboratory Operation.—The list of apparatus tested during the year comprised 310 Brix spindles, 40 flasks, 3 quartz plates, 3 polariscopes, 9 polariscope tubes, 6 refractometers, 15 thermometers and one set of weights. Five refractometers and two polariscopes were overhauled.

The samples analysed included two samples of molasses submitted for analysis as a check on factory methods, two samples of a deposit from fugal backing screens, various sugars for check analysis and a boiler scale. None of these calls for special comment.

Samples of B molasses from mills throughout the State were analysed for aconitic acid content. The results of this survey were reported in a paper by A. D. Doolan contributed to the 1953 Conference of the Queensland Society of Sugar Cane Technologists. Briefly it may be stated that in the 10 samples examined the aconitic acid content ranged from 0.9 to 2.4 per cent. Even the higher figure is far too low for the commercial recovery of the acid to be successful. In the course of the work a sample of dried molasses sludge obtained from the Australian National Power Alcohol Company's distillery at Sarina was analysed and found to contain over 40 per cent of aconitic acid. This material might constitute a source of aconitic acid in commercial quantity.

Sugar Deterioration Tests.—A series of tests known as the "green sack" tests was undertaken in collaboration with the Colonial Sugar Refining Company Ltd. Batches of sugar, each of 16 sacks, were selected at Mossman and Racecourse mills. The sugar was first thoroughly mixed and sampled and bagged in sacks coloured green for purposes of identification. The sacks were weighed and placed in storage at the mill in one of the sugar stacks. Some months later when the sugar was ready for shipment the sacks were weighed again and emptied. The sugar was mixed, sampled, and rebagged, the weight of each sack being determined. The sugar was shipped to a southern refinery where it was again weighed, mixed and sampled.

Every sample was analysed by the C.S.R. Company in Sydney and by the Bureau in Brisbane and Bundaberg. Generally the agreement on analyses was highly satisfactory, though some small but significant differences are under investigation at present.

The Racecourse sugar deteriorated slightly in storage but not in transit to the refinery. The Mossman sugar also deteriorated slightly in storage and then appreciably between the time it was rebagged at Mossman and received at the refinery. Even the samples sealed in cans just before the sugar left Mossman deteriorated to different extents. Between mill and refinery this sugar lost 0.7 per cent of pol and gained about 0.6 per cent reducing sugars. The check on weights in the case of the Racecourse sugar was spoilt by the use of a faulty scale for the intermediate weighings, but the agreement between weights in the case of the Mossman sugar was excellent.

A storage trial along similar lines was arranged between Bingera mill and the Bureau. In this case no significant deterioration was detected.

A report setting out the full analytical details is being prepared for publication.

Sugar Drying Tests.—Tests were conducted on the sugar drying installation at Tully mill with the idea of securing basic data for the design of sugar dryers. The report on the work was presented to the industry in Operations Report 53/1, "Sugar Drying Tests at Tully Mill." Further observations on the subject were made by Mr. C. B. Venton in a paper contributed to the 1953 Conference of theQ.S.S.C.T. The investigations at Tully combined with the results of studies made by the University of Queensland have led to the derivation of what appears to be a satisfactory procedure for adoption in the design of a sugar dryer. More information is required regarding, particularly, the equilibrium moisture relationships of various grades of sugar. This item is under investigation at present.

Juice Deterioration.—Following some preliminary studies made during the 1951 season, the incidence of deterioration in juice samples was investigated more thoroughly in 1952. Tests were conducted by Mr. A. G. Claire, of the Bureau staff, in Bundaberg, and by a group of cane testers at various mills in other districts. A survey of the results was presented by Mr. Claire in a paper to the 1953 Conference of the Q.S.S.C.T., and a more detailed report is being prepared for issue as an Operations Report. The general conclusion from the work was that, in regular factory practice, the incidence of deterioration in sample juices

before analysis is very slight, but unhygienic conditions may lead to rapid deterioration. The report stresses the importance of evaporation as a source of faulty analytical results. Throughout the work the value of Horne's dry lead as a preservative in the analysis of juice for pol was amply demonstrated.

Milling Tests.—Following the installation at Babinda of a new No. 1 mill equipped with a pressure feeder, Bureau officers spent several weeks at the mill studying the performance of the unit. Adhering to the principle of sampling "first expressed juice" for cane payment purposes the mill management had elected to take the sample juice from the "crusher-feeder". When this policy was decided upon it was suspected that the C.C.S. would be inflated, but the test results provided evidence to suggest that the effects of the change in sampling procedure were negligible. This finding is of such a high degree of signifcance that it must be remembered that it applies specifically to the 1952 season, and is not in conformity with the somewhat meagre theory which may be applied to the case.

From the factory point of view the installation is most attractive and should represent a significant contribution to improved milling. In the tests the best extraction achieved by the complete No. 1 mill unit was not outstanding, but mechanical limitations made it impossible to provide the best mill settings for the comparatively low crushing rate. At higher rates it is confidently anticipated that the five-roller unit will achieve over 80 per cent extraction consistently.

Further work on this unit is planned for the 1953 season, and the detailed record of the 1952 tests has been withheld, for publication along with the results of the trials to be conducted in 1953.

ENGINEERING TECHNOLOGY

Boiler Tests.—Tests were carried out on a new boiler at one of the far northern factories for the purpose of calculating the efficiency of operation at different ratings. This was found to vary from 55.8 per cent (on gross calorific value) at moderate rating to 48.9 per cent with full draught on. Later in the season at this same factory the quantity of feedwater being used was measured. The maximum consumption per hour during the period of the tests was found to be 134,000 lb., which gives an evaporation rate of 5.2 lb. per square foot of heating surface per hour.

The steam supply at another factory was improved after the combustion efficiency of the boilers had been investigated with the aid of a flue gas analyser and draught adjustments made.

A report to a southern factory covering the addition of another mill to the tandem suggested that the existing boiler plant would be sufficient to meet the new conditions.

Electrical.—Drawings and specifications covering the switchboard extensions required for new turbo-alternator plant were supplied to two factories for the purpose of calling tenders.

All main generating units ordered or installed during the last few years were of the geared turbo-alternator type and in all cases were of standard frequency and voltage. This simplifies interconnection with the supply from Regional Board power stations which interconnection is being used to more advantage each year.

About six visits were made to factories for the main purpose of discussing electrical problems.

Turbine Driven Mill.—The 1952 season saw the first application of a turbine for driving a crushing mill in Queensland. The performance of this unit was quite up to expectations and confirmed the excellent reports from overseas where the turbine now appears to be the accepted prime move for all new crushing mills.

The Quaid Loader.—The performance of a Quaid cane loader operating on a farm in the Nambour district was studied and found to be satisfactory. A later visit was made to this farm for the purpose of inspecting a modification of the original Quaid. In this modification the top jaw of the loader is closed hydraulically thereby reducing the manual effort required. The modification appeared to be a distinct improvement although the farmer concerned did not think it gave any appreciable increase in the loading rate, which is about ten tons per hour.

Cane Treatment Tanks.—Hot water tanks for treating cane plants against ratoon stunting disease have been set up in a number of districts. A general design for a tank

using steam heating coils and automatic temperature control was drawn up and made available to all interested parties. An inspection of a tank which was made almost exactly in accordance with the Bureau design showed extremely satisfactory operation.

Factory Extensions.—Special visits were made to two factories for the purpose of discussing the plant extensions which would be desirable to allow the most economical efficiency to be maintained at a higher crushing rate. Following these visits, detailed reports were submitted covering the Bureau recommendations.

THE 1952 SEASON

The 1952 cane crop was well grown and maintained good physical condition throughout the harvesting period, being a vastly different proposition from the previous crop which was grown under harsh conditions and largely drought-affected. As a consequence of favourable weather, crops continued to make weight until harvested. While the c.c.s. was naturally depressed, the increased cane weight more than offset the lower sugar. Cane and sugar tonnages were all time records for the State, being 6,841,536 and 934,614 respectively.

The crushing rate, 78.28 tons per hour, is a record but would, no doubt, have been much higher had it been realised that there would be so much cane offering. The actual tonnage of cane exceeded the May estimate by 15 per cent and that of August by 7 per cent. Lost time due to manufacture and mechanical causes was normal, but that lost because of cane supply was higher than usual owing to heavy rains which fell during the early and late weeks of the season. There was some time lost late in the season through industrial disputes regarding overtime work.

The crop days totalled 5046: this is another record, in that an average of 1356 tons of cane per mill per day (including all lost time and week-ends) were crushed and compares with 1224 for the next best in 1951. The pol extraction was 95.57 per cent. This is a slight improvement over the 1951 average but lower than the average for the past ten seasons (95.73).

The upward trend of fibre per cent cane was broken this season because the effects of the season outweighed the increase which has been occurring since the newer varieties displaced the older, softer canes. The fibre averaged 12.44 per cent cane. It is pleasing to note that the lower fibre (and bagasse per cent cane) was accompanied by a reduction in the use of extraneous fuel. The figure of 0.843 added fuel (as bagasse) per cent cane compares with 1.163 for 1951, the next best on record.

The average c.c.s. of 13.90 must be considered satisfactory in view of the class of crop handled. The quality ratio, also, although increased to 7.32, was quite satisfactory and indicates good process work. As might be expected with the cane in good condition there was little trouble in clarification of juice therefrom, and benefits are evidenced in the more regular and higher quality of the sugar made during the season, the average net titre being 97.38 compared with 96.97 in 1951.

The factory performance figures show that the standard of the process work was maintained in spite of the increased speed of operation. Actually, the Recovery, Boiling House Efficiency and Coefficient of Work all rose slightly above the corresponding figures for 1951. Doubtless this may be a reflection of more favourable seasonal conditions, but at least it was not due simply to the treatment of material of high initial purity. The purities of first expressed juice, clarified juice and syrup were all slightly lower in 1952 than in 1951.

A further step in the steady downward trend in molasses purity is seen in the average, 43.32, compared with 44.83, the next best, in 1951.

TABLE X

Production Data for Queensland Mills for Seasons 1946-1952.
(Totals and Weighted Averages)

Northern District*

	1946	1947	1948	1949	1950	1951	1952
Cane—							
Tons	1,551,959	1,876,137	2,478,083	2,426,929	2,622,402	2,135,564	3,092,819
Pol per cent.	16.68	14.81	15.55	15.50	14.40	15.64	14.84
Fibre per cent.	10.57	10.62	10.55	10.58	10.35	11.26	11.24
C.C.S.	15.54	13.66	14.39	14.36	13.21	14.58	13.70
Purity 1st Expressed Juice	90.08	88.60	89.24	89.17	87.81	90.08	88.47
Sugar—							
Tons 94 net titre	233,732	255,958	356,959	345,684	344,944	304,786	421,921
Cane per ton sugar	6.64	7.33	6.94	7.02	7.60	7.01	7.40
Pol per cent.	98.70	98.48	98.60	98.42	98.47	98.52	98.66
Net titre	97.45	96.91	97.24	96.99	97.12	97.07	97.33
Dilution indicator	29.0	33.0	30.0	30.0	29.0	28.8	31.3
Pol per cent. pol cane	85.65	84.89	86.60	84.59	85.29	85.39	86.61
Mud—							
Tons	26,009	33,152	37,485	42,450	46,765	38,342	53,197
Mud per cent. cane	3.04	2.85	2.67	3.12	3.10	3.13	2.91
Pol per cent.	3.80	3.41	3.93	3.59	3.66	4.10	4.50
Pol per cent. pol cane	.69	.66	.67	.72	.79	.82	.90
Molasses—							
Gallons (1000's)	3.980	5,066	6,087	6,143	6,737	4,950	7,905
Gallons per ton cane	4.66	4.36	4.33	4.51	4.48	4.04	4.32
Brix	85.92	86.74	86.40	86.57	86.36	88.82	88.28
Apparent purity	36.18	32.41	33.01	34.15	30.93	33.78	31.66
True purity	48.92	..	46.47	47.78	44.73	45.57	43.36
Expected purity	..	..	..	..	..	38.36	37.99
Reducing sugars	14.88	17.50	18.28	17.96	20.97	17.59	18.87
Pol per cent. pol cane	5.52	5.35	5.23	5.68	5.36	4.86	5.90
Final Bagasse—							
Tons	194,494	258,536	308,282	308,622	335,620	295,620	429,961
Bagasse per cent. cane	22.75	22.34	21.93	22.68	22.26	24.14	23.48
Pol per cent	3.03	2.45	2.86	3.12	3.04	3.09	2.97
Dry substance	50.40	51.04	51.70	50.70	50.49	51.33	52.30
Pol per cent. pol cane	4.13	3.68	4.04	4.75	4.70	4.77	4.64
Undetermined loss—							
Pol per cent. pol cane	4.01	5.42	3.46	4.26	3.86	4.16	1.95
Fuels—							
Tons: wood	10,291	7,389	5,378	5,702	8,768	3,847	5,175
coal	..	16					
molasses	5,232	9,057	10,691	8,436	16,691	6,577	5,951

* The figures for tons of cane, tons of sugar and tons of cane per ton of sugar refer to all mills. All other figures exclude C.S.R. Co. Mills.

Central District*

	1946	1947	1948	1949	1950	1951	1952
Cane—							
Tons	1,716,764	1,380,368	2,572,089	2,691,364	2,580,013	1,971,468	2,685,687
Pol per cent.	15.21	16.44	15.98	15.41	14.96	16.44	15.95
Fibre per cent.	11.34	12.16	12.67	12.10	12.68	13.35	12.56
C.C.S.	13.69	15.36	14.76	14.11	13.93	15.28	14.80
Purity first expressed juice	85.64	90.59	88.85	87.59	89.60	89.66	89.56
Sugar—							
Tons 94 net titre	227,754	204,780	373,003	375,654	355,751	286,416	388,343
Tons cane per ton sugar	7.54	6.74	6.90	7.16	7.25	6.88	7.02
Pol per cent.	98.87	98.91	98.83	98.96	98.74	98.52	98.82
Net titre	97.63	97.57	97.62	97.91	97.25	96.81	97.37
Dilution indicator	27.0	30.0	28.0	33.0	29.0	28.2	30.0
Pol per cent. pol cane	82.96	85.94	86.46	86.27	86.73	84.12	86.46
Mud—							
Tons	70,807	49,767	83,008	86,934	81,414	64,799	81,139
Mud per cent. cane	4.12	3.61	3.23	3.23	3.15	3.49	3.33
Pol per cent	2.15	1.88	2.27	2.67	2.67	3.36	3.21
Pol per cent. pol cane	.58	.41	.46	.56	.55	.71	.57
Molasses—							
Gallons (1,000's)	11,147	6,777	13,828	15,378	10,681	9,649	12,573
Gallons per ton cane	6.69	4.91	5.38	5.72	4.14	4.89	4.68
Brix	88.02	88.32	88.83	88.73	88.57	90.33	90.45
Apparent purity	34.44	37.69	35.40	34.11	36.17	35.35	34.50
True purity	45.68	..	46.56	45.40	45.74	45.01	44.01
Expected purity	..	..	..	..	..	40.64	40.80
Reducing sugars	23.81	14.57	17.30	19.97	16.19	16.49	16.09
Pol per cent. pol cane	8.44	6.51	7.05	7.37	5.73	5.96	5.92
Final Bagasse—							
Tons	426,219	344,687	657,839	697,490	668,330	552,250	695,837
Bagasse per cent. cane	24.82	24.97	25.58	25.91	25.89	27.34	25.91
Pol per cent.	3.03	2.62	2.58	2.67	2.37	2.71	2.60
Dry substance	49.71	52.14	52.99	50.99	51.48	51.71	52.40
Pol per cent. pol cane	4.94	3.97	4.12	4.49	4.04	4.60	4.19
Undetermined Loss—							
Pol per cent. pol cane	3.08	3.17	1.91	1.31	2.95	4.61	2.86
Fuels—							
Tons wood	15,322	4,988	9,315	8,576	10,140	5,084	3,822
coal	637	271	244	743	528	225	233
molasses	1,083	0	40	98	18	..	..

* 1946-1949 fuel figures exclude Pioneer and Inkerman.

SOUTHERN DISTRICT

	*1946	1947	1948	1949	1950	1951	1952
Cane—							
Tons	445,752	894,482	1,383,884	1,399,749	1,489,291	898,140	1,063,030
Pol per cent	13.23	14.31	14.58	14.07	13.50	14.07	13.21
Fibre per cent.	13.47	14.68	14.23	14.80	14.96	14.56	14.19
C.C.S.	11.54	13.01	13.28	12.83	12.32	12.69	11.90
Purity first expressed juice	81.18	88.05	86.95	87.10	87.10	85.76	85.40
Sugar—							
Tons 94 net titre	50,600	110,920	180,077	175,929	179,149	113,140	124,350
Cane per ton sugar	8.81	8.07	7.68	7.96	8.31	7.94	8.55
Pol per cent.	98.72	99.06	99.10	98.90	98.80	98.80	98.94
Net titre	97.02	96.96	97.96	97.08	97.33	97.24	97.55
Dilution indicator	27.0	25.0	28.0	33.0	34.0	28.6	31.5
Pol per cent pol cane	81.99	83.86	85.04	85.34	85.32	85.61	84.62
Mud—							
Tons	15,601	30,515	40,951	42,957	52,451	35,971	37,451
Mud per cent. cane	3.69	3.39	3.10	3.09	3.66	4.02	3.56
Pol per cent	3.20	2.55	3.10	2.99	2.53	2.42	2.70
Pol per cent pol cane	.89	.61	.65	.66	.69	.70	.72
Molasses—							
Gallons (1,000's)	3,204	4,506	7,242	6,826	6,744	4,445	5,232
Gallons per ton cane	7.14	5.13	5.25	4.88	4.53	4.97	4.97
Brix	88.06	88.58	89.47	89.16	90.75	91.27	91.77
Apparent purity	34.60	38.70	37.40	38.48	37.60	33.84	34.44
True purity	45.04	..	46.39	46.80	45.57	43.72	43.24
Expected purity	..	..	..	..	..	40.56	41.09
Reducing sugars	19.59	13.05	15.35	13.95	14.68	17.81	17.08
Pol per cent pol cane	11.04	7.85	7.93	7.85	7.55	6.92	7.98
Final Bagasse—							
Tons	126,496	257,705	397,317	416,113	437,610	275,890	317,961
Bagasse per cent. cane	29.20	29.22	29.02	30.22	30.56	30.85	30.23
Pol per cent	2.14	1.94	2.02	1.95	1.95	2.19	2.10
Dry substance	49.41	51.07	51.98	52.01	51.40	50.47	49.87
Pol per cent. pol cane	4.38	3.87	4.01	4.20	4.42	4.83	4.75
Undetermined Loss—							
Pol per cent. pol cane	1.70	3.81	2.37	1.95	2.02	1.94	1.93
Fuels—							
Tons wood	9,532	4,421	5,925	5,558	3,870	4,306	3,493
coal	1,001	513	77	88	351	642	511
molasses	0	0	0	0	0	0	0

* In 1946, Mt. Bauple is excluded from mud and fuel figures, and Rocky Point from all except tons of cane, tons of sugar and tons of cane per ton of sugar. Mt. Bauple excluded from all except tons cane, tons sugar and tons cane per ton sugar in 1950 and from all figures in 1951 and 1952.

All Queensland Districts.

	1946	1947	1948	1949	1950	1951	1952
Cane—							
Tons	3,714,475	4,150,987	6,433,556	6,518,042	6,691,706	5,005,172	6,841,536
Pol per cent.	15.33	15.34	15.51	15.09	14.52	15.68	15.07
Fibre per cent.	11.44	12.28	12.51	12.41	12.52	12.99	12.44
C.C.S.	13.89	14.18	14.28	13.85	13.40	14.50	13.90
Purity 1st expressed juice	86.23	89.26	88.47	87.86	88.43	88.93	88.21
Sugar—							
Tons 94 net titre	512,086	571,658	910,049	897,267	879,844	704,342	934,614
Cane per ton sugar	7.25	7.26	7.07	7.26	7.61	7.11	7.32
Pol per cent.	98.80	98.81	98.83	98.81	98.68	98.58	98.78
Net tire	97.36	97.50	97.60	97.75	97.22	96.97	97.38
Dilution Indicator	28.0	30.0	29.0	31.0	30.0	28.4	30.5
Pol per cent. pol cane	83.67	85.11	86.16	85.62	86.00	84.79	86.21
Mud—							
Tons	112,417	113,434	161,444	171,981	180,630	139,112	171,787
Mud per cent. cane	3.75	3.31	3.02	3.17	3.27	3.36	3.23
Pol per cent.	2.68	2.51	2.86	2.97	2.88	3.32	3.56
Pol per cent. pol cane	.66	.54	.56	.62	.65	.74	.70
Molasses—							
Gallons (1000's)	18,331	16,349	27,158	28,356	24,162	19,044	25,710
Gallons per ton cane	6.07	4.78	5.07	5.22	4.33	4.66	4.62
Brix	87.58	87.91	88.46	88.36	88.55	90.20	90.04
Apparent purity	34.84	36.35	35.40	35.17	35.10	34.59	33.61
True purity	46.26	..	46.49	46.22	45.36	44.83	43.32
Expected purity	..	..	..	..		39.92	39.90
Reducing sugars	21.18	15.17	16.95	17.84	17.19	17.15	17.21
Pol per cent. pol cane	7.85	6.45	6.78	7.05	6.07	5.82	6.25
Final bagasse—							
Tons	747,209	860,928	1,363,438	1,422,225	1,441,560	1,123,760	1,443,759
Bagasse per cent. cane	24.86	25.16	25.50	26.20	26.11	27.15	25.93
Pol	2.87	2.36	2.48	2.56	2.40	2.68	2.60
Dry substance	49.86	51.49	52.41	51.25	51.23	51.31	51.82
Pol per cent. pol cane	4.62	3.85	4.07	4.49	4.31	4.69	4.43
Undetermined loss—							
Pol per cent. pol cane	3.20	4.05	2.43	2.22	2.97	3.96	2.41
Fuels—							
Tons: wood	35,145	16,798	20,618	19,836	22,778	13,237	12,562
coal	1,638	800	321	1,150	879	867	744
molasses	6,315	9,057	10,731	8,534	16,709	6,577	5,951

Tons of cane, tons of sugar and tons of cane per ton of sugar include all mills. All other figures exclude C.S.R. Mills only, except—

In 1946, Mt. Bauple is excluded from Mud and Fuel figures; and Rocky Point from all except tons of cane, tons of sugar and tons cane per ton Sugar and Fuel figures.

In 1950, 1951, and 1952, Fuel figures include Pioneer and Inkerman. Mt. Bauple is excluded from all except tons cane, tons sugar and tons cane per ton of sugar in 1950, and from all figures in 1951 and 1952.

TABLE XI

Sugar Produced in Districts, 1952 Season, with Peak Allocations

Districts	Tons 94 Net Titre Sugar			Production per cent. Peak
	Produced	Peak	Excess Production over Peak	
Northern	421,921	401,500	+ 20,421	105.09
Central	388,343	379,000	+ 9,343	102.47
Southern	124,350	182,580	— 58,230	68.11
All Districts	934,614	963,080	— 28,466	97.04

TABLE XII

Tons of Cane per Ton 94 Net Titre Sugar, 1943-1952

Season	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Tons Cane per ton 94 N.T. Sugar	6.98	6.83	7.06	7.25	7.26	7.07	7.26	7.61	7.11	7.32

TABLE XIII

Figures for 1952 Season
(Totals and Arithmetic Averages)

	Northern	Central	Southern	All Districts
Tons Cane Crushed	3,092,819	2,685,687	1,063,030	6,841,536
Tons 94 N.T. Sugar made	421,921	388,343	124,350	934,614
Net Titre of Sugar	97.29	97.42	97.28	97.35
Tons Cane per ton 94 N.T. Sugar	7.33	6.94	8.88	7.63
C.C.S. of Cane	13.59	14.81	11.91	13.69
Coefficient of Work	98.24	97.32	97.30	97.53
Coefficient of Work E.S.G.	93.28	92.46	92.55	92.68
Crushing Rate	91.41	81.19	64.07	78.28
Lost Time per cent. Available Time	9.20	5.45	12.19	8.39
Fibre of Cane	11.31	12.75	14.27	12.88
Pol of Cane	14.92	15.97	13.26	14.89
First Expressed Juice—				
Brix	20.13	21.65	19.22	20.55
Purity	88.56	89.55	85.44	88.06
Purity—				
Clarified Juice	88.51	87.92	84.87	87.12
Syrup	88.11	88.11	84.83	87.15
Dilution per cent. First Expressed Juice	22.89	32.29	36.93	31.55
Final Bagasse—				
Pol	2.97	2.65	2.26	2.61
Dry Substance	52.66	52.06	50.69	51.75
Pol Extraction	95.34	95.65	94.89	95.35
Reduced Extraction	94.77	95.72	95.62	95.47
Final Molasses—				
Gallons per ton Cane	4.41	4.75	5.04	4.76
Brix	87.85	90.37	91.30	90.08
Apparent Purity	31.91	34.46	34.47	33.88
True Purity	43.99	43.63	43.37	43.64
Expected Purity	37.88	40.76	40.78	40.05
Reducing Sugars	19.32	16.13	17.23	17.29
Final Mud—				
Per cent. Cane	2.84	3.32	3.49	3.26
Pol per cent. Mud	4.83	3.54	3.11	3.71
Sugar—				
Pol	98.64	98.83	98.82	98.77
Reducing Sugars	.42	.29	.25	.31
Ash	.18	.23	.24	.22
Moisture	.33	.27	.26	.28
Dilution Indicator	31.	29.	29.	30.
Pol Balance—				
Sugar (Recovery)	86.45	86.11	83.71	85.45
Bagasse Loss	4.66	4.35	5.12	4.65
Molasses Loss	6.10	6.03	7.88	6.61
Mud Loss	.89	.61	.75	.72
Undetermined Loss	1.90	2.90	2.54	2.57
Boiling House Efficiency	95.64	94.44	94.66	94.78
Boiling House Efficiency E.S.G.	95.23	94.08	94.31	94.41
Fuels (as equivalent Bagasse per cent. Cane)—				
Wood	.60	.33	1.16	.62
Coal	.00	.03	.11	.04
Molasses	.64	.00	.00	.15
Total added	1.24	.36	1.27	.81
Bagasse	27.41	30.51	33.61	29.61
Total Fuel	28.65	30.87	34.88	30.42
Crop Days				

TABLE XIV

Average Performance of Queensland Mills, excluding C.S.R. Mills, 1951-1952 Seasons
(Arithmetic Averages)

	Northern		Central		Southern		All Districts	
	1951	1952	1951	1952	1951	1952	1951	1952
Cane—								
Pol	15.67	14.92	16.47	15.97	14.08	13.26	15.55	14.89
Fibre	11.25	11.31	13.50	12.75	14.56	14.27	13.31	12.88
Purities—								
First expressed juice	90.04	88.56	89.43	89.55	85.70	85.44	88.42	88.06
Clarified juice	89.36	88.51	87.89	87.92	84.83	84.87	87.29	87.12
Syrup	89.19	88.11	88.02	88.11	84.96	84.83	87.35	87.15
Molasses—								
Gallons per ton cane	4.25	4.41	5.01	4.75	5.21	5.04	4.89	4.76
Apparent purity	34.01	31.91	35.32	34.46	34.50	34.47	34.76	33.88
Recovery overall	84.89	86.45	83.93	86.11	84.58	83.71	84.35	85.45
Recovery overall E.S.G.	84.49	86.09	83.52	85.79	84.24	83.41	83.96	85.12
Recovery on mixed juice	89.05	90.67	88.02	90.03	89.06	88.21	88.58	89.61
Recovery on mixed juice E.S.G.	88.64	90.28	87.59	89.69	88.70	87.88	88.17	89.27
Boiling House efficiency	93.17	95.64	92.39	94.44	95.48	94.66	93.52	94.78
Boiling House efficiency E.S.G.	92.74	95.23	91.94	94.08	95.13	94.31	93.10	94.41
Pol extraction	95.33	95.34	95.35	95.65	94.96	94.89	95.23	95.35
Reduced extraction	94.71	94.77	95.73	95.72	95.78	95.62	95.51	95.47
C.C.S.	14.63	13.59	15.29	14.81	12.70	11.91	14.34	13.69
Coefficient of work	95.30	98.24	94.76	97.32	98.19	97.30	95.94	97.53
Coefficient of work E.S.G.	90.52	93.28	90.26	92.66	93.50	92.55	91.32	92.68

TABLE XV

Cane Milled and Sugar Yielded, 1952 Season.

Mills	Tons Cane Crushed	Tons 94 n.t. Sugar made	Tons Cane per ton Sugar	
			1952	1951
Mossman	179,097	24,567	7.286	7.280
Hambledon	274,982	39,600	6.994	6.651
Mulgrave	312,114	44,462	7.017	6.856
Babinda	285,839	37,966	7.527	7.469
Goondi	280,528	36,786	7.626	7.353
South Johnstone	383,011	51,415	7.449	7.000
Mourilyan	247,903	33,335	7.436	7.248
Tully	421,739	55,140	7.648	7.236
Victoria	343,989	50,672	7.000	6.654
Macknade	363,617	47,924	7.364	6.802
Local Sales	—	54	—	—
Northern District Totals and Averages	3,092,819	421,921	7.401	7.007
Invicta	117,782	17,342	6.792	6.554
Pioneer	283,907	42,307	6.710	6.880
Kalamia	315,382	47,602	6.625	6.551
Inkerman	378,849	54,606	6.937	6.992
Proserpine	250,356	35,015	7.146	6.884
Cattle Creek	112,784	16,029	7.034	7.151
Racecourse	254,073	36,223	7.001	6.950
Farleigh	211,954	30,401	6.968	7.030
North Eton	85,719	12,118	7.071	6.976
Marian	201,560	28,384	7.096	6.958
Pleystowe	256,180	37,044	6.908	6.853
Plane Creek	217,141	31,062	6.986	6.940
Local Sales	—	210	—	—
Central District Totals and Averages	2,685,687	388,343	7.020	6.883
Qunaba	89,009	9,885	9.008	8.295
Millaquin	214,422	26,535	8.257	7.647
Bingera	197,734	22,957	8.617	7.991
Fairymead	199,095	22,404	8.653	7.963
Gin Gin	37,037	3,893	9.455	8.747
Isis	126,335	14,672	8.608	7.600
Maryborough	67,830	8,522	7.959	7.727
Moreton	119,302	14,190	8.384	8.293
Rocky Point	12,266	1,168	10.475	9.855
Local Sales	—	124	—	—
Southern District Totals and Averages	1,063,030	124,350	8.549	7.938
All Districts Totals and Averages	6,841,536	934,614	7.320	7.106

TABLE XVI

Average Crushing Rates, 1943-1952, excluding C.S.R. and Rocky Point Mills
(Arithmetic Averages)

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Tons Cane per hour	55.45	57.33	59.32	59.48	60.55	66.33	68.74	72.35	71.47	78.28

Total Crop Days, All Mills, 1943-1952

	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Total Crop Days	4,270	4,749	4,872	3,740	4,289	5,708	5,593	6,469	4,089	5,046

TABLE XVII

Analysis of Gross Time, 1952 Season, Excluding C.S.R. Mills

—	Total Hours	Per Cent. Gross Total Hours	Per Cent. of Available Hours
Crushing Time	68,375.89	66.48	92.01
Lost Time—			
Manufacture	3,330.82	3.24	4.48
Cane Supply	2,609.68	2.54	3.51
Total Available Hours	74,316.39	72.26	100.00
Premeditated and Week-end Stops	28,525.22	27.74	—
Gross Total Hours	102,841.61	100.00	—

TABLE XVIII

Fuels Calculated as Equivalent Bagasse Per Cent. Cane, 1943-1952
(Arithmetic Averages)

Year	Wood	Coal, etc.	Molasses	Total Added	Bagasse	Total Fuel
Northern District						
1943	1.410	..	2.224	3.634	23.182	26.816
1944	1.063	..	1.770	2.833	22.633	25.466
1945	1.830	..	1.552	3.382	23.021	26.403
1946	2.287	..	1.088	3.375	22.858	26.233
1947	1.167	.005	.913	2.085	22.988	25.073
1948	.672	..	1.535	2.207	23.063	25.270
1949	.726	..	1.102	1.828	23.242	25.070
1950	1.050	..	1.878	2.928	24.468	27.396
1951	.598	..	1.220	1.818	27.169	28.987
1952	.598	..	.640	1.238	27.413	28.651
Central District						
1943	2.589	.189	.198	2.976	26.163	29.139
1944	1.995	.131	.180	2.306	27.061	29.367
1945	1.372	.092	.326	1.790	28.144	29.934
1946	2.730	.132	.132	2.994	25.183	28.177
1947	1.487	.025	.019	1.531	28.068	29.599
1948	1.617	.037	.002	1.656	28.497	30.153
1949	.899	.153	.005	1.057	27.397	28.454
1950	.763	.053	.001	.817	29.731	30.548
1951	.564	.028	..	.592	32.369	32.961
1952	.331	.029	..	.360	30.507	30.867
Southern District						
1943	5.385	.380	..	5.765	29.358	35.123
1944	4.306	.151	..	4.457	29.326	33.783
1945	3.565	.059	..	3.624	30.550	34.174
1946	5.693	.697	..	6.390	29.341	35.731
1947	3.785	.141	..	3.926	30.388	34.314
1948	1.977	.009	.012	1.998	31.010	33.008
1949	1.633	.016	..	1.649	32.138	33.787
1950	.694	.060	..	.754	35.285	36.039
1951	1.362	.164	..	1.526	34.485	36.011
1952	1.160	.110	..	1.270	33.614	34.884
All Queensland Districts						
1943	3.313	.212	.613	4.138	26.598	30.736
1944	2.603	.107	.497	3.207	26.814	30.021
1945	2.218	.058	.524	2.800	27.781	30.581
1946	3.516	.270	.341	4.127	25.842	29.969
1947	2.238	.062	.226	2.526	27.684	30.210
1948	1.519	.018	.374	1.911	28.098	30.009
1949	1.122	.067	.266	1.455	28.106	29.561
1950	.808	.043	.434	1.285	30.225	31.510
1951	.818	.063	.282	1.163	31.820	32.983
1952	.648	.047	.148	.843	30.748	31.591

The Courier-Mail Printing Service